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Artificial Intelligence Through the Eyes of the Public

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Artificial Intelligence Through the Eyes of the Public

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Abstract:

Artificial Intelligence is becoming a popular field in computer science. In this report we explored its history, major accomplishments and the visions of its creators. We looked at how Artificial Intelligence experts influence reporting and engineered a survey to gauge public opinion. We also examined expert predictions concerning the future of the field as well as media coverage of its recent accomplishments. These results were then used to explore the links between expert opinion, public opinion and media coverage.

Authorship

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1. Introduction

1.1 Subject

Artificial Intelligence (AI) is difficult to define. John McCarthy, one of the founders of the field, defines AI as the science and engineering of making intelligent machines, especially intelligent computer programs (McCarthy). It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically-based. This definition is appropriate in that it contains three main features of Artificial Intelligence. The first is its concern with mechanical intelligence, or the emulation of intelligence with a computer. The second is that Artificial Intelligence contains aspects that are engineering in nature, that is, it is the creation of mechanical artifacts. The last feature is that Artificial Intelligence tends to look at intelligence in a general fashion – which means that it does not always restrict itself to human intelligence.

In this report we will focus mainly on the common perceptions of AI. We define perceptions as the points-of-view taken on a given subject or phenomenon, restricted to views concerning its future, its accomplishments, as well as emotional reactions to the said subject.

1.2 Goals

There have been various trends in AI ever since its inception. In the earlier days of Artificial Intelligence, there was an enormous amount of hype about the possibilities of computer technology in creating intelligent machines (Dreyfus ix). These expectations were unrealistic.

We wish to examine the current views expressed by both experts and laypeople about the nature of Artificial Intelligence, as well as about the possibilities of AI technology in the near future. In examining both of these we will consider the extent to which expert opinions and the current trends in Artificial Intelligence align with the views and opinions of the laypeople. From this we hope to comprehend the extent to which the opinions held by laypeople correspond to the actual innovations in Artificial Intelligence, as well as its past and future applications.

1.3 Motivation

Computers are becoming a more integral part of our society. These machines are now becoming more connected than ever. The World Wide Web, one of the main channels of communication on the Internet, is steadily applying results in AI.

Artificial intelligence as a field is also growing and expanding. New paradigms such as Neural Networks are now viable for real-world and industrial applications. Several fields have matured to the extent that now they are considered common practices. When any new field develops it is crucial that a society reflects upon its benefits and possible disadvantages. One way of starting such a discussion is to know what is already thought about the subject. We wish to contribute to the discussion on the possibilities and perils of AI.

1.4 Possible Outcomes

We will look at public and professional perceptions of Artificial Intelligence from three fundamental dimensions – the future, past accomplishments and present use. We can expect several possibilities of realistic or non-realistic perceptions.

The first possibility would be of non-realistic views about the future of Artificial Intelligence. These views may range from unrealistic expectations about the immediate future of AI such expectations of generally intelligent machines.

However, there may be underestimations of the possible success of Artificial Intelligence. There might also underestimation of AI's accomplishments due to a lack of knowledge about what has been done or has not yet been done. In judgments about of AI use one can expect a lack of information on AI's widespread industrial and commercial usage as well as AI-related applications in daily life. In addition, if we examine public fears of AI we may see a range of emotional reactions some verging on irrational fear while others are fully apathetic. These emotional reactions would most likely depend on the technical knowledge of the responders as well as the type of media they have been exposed to.

By uniting these various perspectives we will hope to attain a balanced view on public and professional opinions concerning Artificial Intelligence.

2. Review of Related Work

2.1 Past IQP

In the report "Mainstream: Artificial Intelligence and Society", Kerry et. al.(2002) deal with the topic of Artificial Intelligence by exploring pop culture, applications and public opinion by survey. They also pose moral questions about how intelligent machines ought to be treated as well as the impact they may have on society.

While exploring the history of Artificial Intelligew121111nce, Kerry et. al. (2002, p.9)discuss early discoveries in the field by Alan Turing and what is known as Turing's test Turing's test is a type of game in which an interrogator tries to determine which of the two contestants is a machine and which is human. The test has inspired several programs whose goal is to simulate human conversation ability. Other aspects of history that are inspected in their report include Norbert Wiener's early work on cybernetics as well as Allen Newell and Herbert Simon's first programs on problem solving (Kerry et. al. 2002, p. 7). Norbert Wiener is well-known in the field of Artificial Intelligence as the first person to create a theory of communication and control with enough complexity to allow for intelligent behavior, while Simon and Newell were some of the first people to write Artificial Intelligence programs.

The report provides examples of several programs that were influenced by this early work of Artificial Intelligence, particularly by Turing's ideas. These programs are what are called chatbots. Chatbots are a type of program that are able to communicate linguistically with human beings in a deceptively human-type of way. Research in chatbots is partly motivated by Turing's test (Kerry et. al. 2002, p. 12). The report mentions Hal(a well-known fictional computer that can speak intelligently) and other bots which they consider to be very close to the goal of Artificial Intelligence. They also cover the moral implications of Artificial Intelligence. They judge that in the future Artificial Intelligence will be pervasive throughout computing. However, they also say that Artificial Intelligence could be potentially misused for malicious gain. But they believe overall that the effects of Artificial Intelligence on society will be good and that it will allow us more leisure time.

They then delve into the different applications of Artificial Intelligence. Some of these applications include use in the military, medical fields or for entertainment purposes. Another

application of Artificial Intelligence that they mention is the use of Artificial Intelligence in creating realistic game characters. Artificial Intelligence in games evolved from simple characters to complex interactions and levels that depend greatly on context. They give examples of games such as Sims, and Petz and other games that react dynamically and realistically to the player(Kerry et. al. 2002, p. 20).

On a more technical note, they examine the possibility of machine learning. They claim that generally people do not believe that computers have such abilities but that those who work in Artificial Intelligence not only see learning computers as a possibility, but as a necessity (Kerry et. al. 2002, p. 13). They then go on to mention the different forms of learning. These forms of learning are categorized into a distinction between simulation and emulation saying that Artificial Intelligence tends to tackle its problem either by simulating abstract thoughts or concentrating on the way that the brain itself processes information.

They examine the philosophical, moral and ethical implications of machines that are of sufficient intelligence. They believe that the question can eventually be settled by determining whether or not machines have free will.

They also speak about the possible danger of Artificial Intelligence and address Asimov's three laws of robotics. They argue that these may restrict the will of robots. They then argue that the robots/machines may be incompatible with human beings due to their behavior and this may turn out to be gravely dangerous.

Kerry et. al carried out a survey ofpublic opinions about Artificial Intelligence. In terms of response, about 70 percent of the responders were male, 25 percent were female and 5 percent were unreported. Their results indicated that the majority of responders believe that Artificial Intelligence could be attained within this century and if not, it is at least theoretically possible. Surprisingly though, of the people quizzed only a little over 50 percent believed that machines could one day think by themselves.

Concerning more social and ethical issues, the authors had asked about the result of robots replacing human beings. Most responded by saying that this may cause problems. A question was also asked about whether or not intelligent machines should be given rights: the overwhelming majority of responders answered in the negative.

In terms of interacting with Artificial Intelligence and sources of knowledge about the field, the answers were more varied. Some reported using Artificial Intelligence daily, others weakly, some monthly and yearly - a surprising number reporting never to have interacted with Artificial Intelligence at all (the numbers are 80, 38, 26, 11 and 34 people respectively).

Overall this previous IQP provided us with a framework on which to base our IQP on. After reading about their project, we decided to also study the media's coverage of and expert opinions about Artificial Intelligence. We also decided to conduct a survey in order to gauge public opinion and link the findings to our own.

Unlike the previous IQP, we decided not to cover the social and moral implications of Artificial Intelligence. Our media analysis also did not include any information about Artificial Intelligence in pop culture.

3. Problem

3.1 Goals

The major goal of this project is to analyze the extent to which public and expert opinion mirrors the reality of the Artificial Intelligence field. This goal is further divided into the study of two core relations, the relationships between the experts and the media; and between the media and the public.

The link between expert opinions and the media is important because it reveals the difference between what the media is covering and what the experts are saying. The second link, the relationship between the media and the public, is important because, assuming that the public attains information about Artificial Intelligence through the media, it would reveal how the public perceives Artificial Intelligence.

The relationship between expert opinions and the media will be further subdivided into an investigation of past interactions and present interactions between the two.

We wish to analyze and compare both of these relations to reveal the extent to which experts influence public opinion and how this biases public perceptions of Artificial Intelligence.

3.2 Requirements

In order to better emphasize our goals and how we plan to reach them, we have mapped out the following sub-goals that will help better define our main goals.

1. Investigate the following categories:
    a. The history of Artificial Intelligence.
    b. The current state of Artificial Intelligence according to the media.
    c. The current state of Artificial Intelligence according to the experts.
    d. The past and present predictions by Artificial Intelligence experts.
2. Create and distribute a survey to gather data about what people think about Artificial Intelligence.
3. Provide a strong analysis of open-ended responses and media related responses to survey questions.

4. Compare the current state of Artificial Intelligence according to the media to that of the experts.
5. Compare the results of the survey to the current state of Artificial Intelligence according to the media.
6. Through these two comparisons draw conclusions about whether the public is well informed about the field of Artificial Intelligence.

If we break down these sub-goals even further we can establish the following requirements that our project must meet:

1. Create at least five Likert scale type survey questions to assist in the survey analysis by providing ample numerical data.
2. Create at least one open-ended response survey question in order to attain specific information about Artificial Intelligence events and their impact.
3. Obtain at least 300 responses to our survey for statistically significant results.
4. Read and analyze past studies and/or surveys dealing with public perceptions of Artificial Intelligence.
5. Summarize and explain at least 15 media articles that cover topics in Artificial Intelligence to ensure sufficient coverage of the media's interactions with Artificial Intelligence.
6. Describe major subfields and paradigms of Artificial Intelligence.
7. Summarize and explain at least five major predictions for the future of Artificial Intelligence.

4. Methodology

4.1. Motivation

This project began in A term 2010 as an IQP concerned with the social implications of Artificial Intelligence. We began researching Artificial Intelligence with an introduction to AI textbook and some early papers by Minsky, Allen Newell, and Herbert Simon. We also looked at several websites such as Wikipedia and the academic web pages of the primary AI figures.

While researching, we started to wonder if the media was the main driving force for people's understandings of Artificial Intelligence. In other words, little attention is given to the actual researchers taking part in Artificial Intelligence projects. Instead the media seems to be the gateway allowing only opinions and perceptions of Artificial Intelligence to emanate.

Continuing our research, we soon realized that with proper methodology, we could examine the public's perception of Artificial Intelligence and provide a comparison between these perceptions and where the field has come from, where it is currently and where it is going. This arose out a realization that performing an in depth philosophical or literature review of the field was highly unrealistic since there was just too much information about the technical side of Artificial Intelligence, while the social side of Artificial Intelligence was not as well-researched.

To examine the public's perception of Artificial Intelligence, we determined that a survey would be an appropriate research method, as it is a suitable way of obtaining public perspectives on issues. Surveys are easily distributed, malleable to the subject being researched, and most importantly they provide statistical information about the relationship between variables.

4.2. Process

4.2.1. Historical Background

This project was at first conceived as a philosophical and critical work about Artificial Intelligence because Artificial Intelligence has a special relationship to the philosophy of mind. The philosophical and historical foundations of Artificial Intelligence were the first major aspects to be tackled. The initial research for them concentrated on major figures of the field and philosophical commentators. In order to provide the intellectual foundations of the field, we wrote a brief overview of the historical figures of AI. This initial overview was later expanded and refined as we changed the intent of the project.

The first difficulty in researching the subject of Artificial Intelligence was to decide what major intellectual trends were of importance. Understanding Artificial Intelligence as a field dedicated to mechanical intelligence did not guide us completely since there are so many individuals in the intellectual history that could have directed these trends. We decided to make the project manageable by exploring the development of computation (from a philosophical perspective) as well as the influence earlier works in logic had on this development.

With this we were able to link several developments in the history of logic to the foundations of computer science, which, by means of the work of Alan Turing, led directly to the foundation of Artificial Intelligence. This historical overview served as a backdrop to understanding the basic notions of the field.

We first decided to divide the project into a three-aspect analysis of social opinions of Artificial Intelligence expert predictions, media influence and layperson opinion. We then further subdivided some of these tasks into useful concentrations. Since the survey was designed to answer the lay-person aspect of the analysis, we had to delineate ways of analyzing the first two parts. It became evident that when examining expert predictions it is possible to study predictions made in the past and those made in the present day. The idea then emerged that past expert opinion within Artificial Intelligence might influence public opinion on the subject. The task then became to partly comprehend the expert opinions early on in the field.

This research was carried out primarily by means of the Internet, the reason for this being the convenience of the technology. However, the Internet was mainly used for general knowledge and as a way of attaining information about important literature. We also made use of the library in order to obtain classical books on the history of Artificial Intelligence. In order to evaluate the realistic nature of expert claims, we looked at critics of the field. These books then provided a stepping stone to researching the trends of the field. The criticisms demonstrated both the optimism and pessimism within the field, the media relationships and funding trends. They lead us to consider in detail the veracity of claims by those in Artificial Intelligence and gauge the extent of hyperbole within these claims.

We then researched the influence of these initial expectations on the field as a whole, most importantly the AI Winter of the 1980s. It became evident that experts in the field were

overly optimistic in the early days and made exaggerated claims. The group perspective then became to look at how these initial claims influenced the media at that time and how they may have influenced the AI winter. Then, as part of a further analysis, this look at the relationship between expert opinions and the media in the past could be used a stepping stone to the relationship between expert opinion and the media today.

4.2.2. Media Analysis

The research on the media coverage of Artificial Intelligence required following dozens of major media outlets. Utilizing an RSS (Really Simple Syndication) aggregator, all stories from many sources were aggregated to one location. We choose a few dozen sources, ranging from the New York Times to more specialized blogs such as ScienceDaily. The idea of having such a wide variety between sources was to observe the propagation of stories and try to reduce any personal bias.

Many times a day we weeded through the daily news in search of any examples of Artificial Intelligence, for the major media outlets such as the New York Times. For more specialized sources (those focusing directly on Artificial Intelligence) we kept note of recurring story trends and recorded articles that seemed especially groundbreaking. Over the course of three months, we were able to record approximately fifty stories across the sources. Although we did record duplicate articles on each story for further research purposes, a story only focused on one subject (there were no duplicates this way). These stories were later a jumping point for further research.

With a story that seemed particularly promising, we would first read all the articles that we had saved on the subject to get a sufficient background. With this background, we would search for any available further information (typically on the internet) about the project. This information would allow for us to easily construct a paragraph summary condensing the relevant information behind each project into a s concise format, with citations.

The summaries of Artificial Intelligence stories were then shared within our group, allowing members to quickly view some of the big trends in the media. These summaries were compact and dense with technical information provided by the media. This allowed us to quickly analyze trends which might have made it to the media and identify other trends which did not get

any publicity. The summaries were launching points for deeper research and analysis for all of us.

For a story that had a significant impact, we would often reassess the articles gathered to identify key words. Within the group, a favorite tool for gathering key words was a word frequency map. A word frequency map produces a visual map of frequently repeated words. We then took note of the top twenty-five words that were relevant, omitting words like "and" or "by", for example. These keywords were saved with the word map and recorded with the article summaries.

Those same key words could then be input to Google Trends, a statistical tool that helps identify peaks of searches with those words. From story publication date, we would save the one month, six month, one year and two year chart for comparison. If any interesting conditions appeared in the graphs, we would investigate them by looking at other news events that occurred or exploring other related keywords.

4.2.3. Expert Predictions

After our group had enough of a foundation in Artificial Intelligence and an understanding of its past, we began looking into some information about the future of Artificial Intelligence. Our main goal behind this was to determine where the experts thought Artificial Intelligence was going. The field has had a long and isolated past that has restricted its growth, but now as Artificial Intelligence invades our everyday lives, what the future holds for Artificial Intelligence has become an important concern.

The future of Artificial Intelligence has been a driving force for the field since the beginning. The apparently crazy ideas originally put forth by a few have now become a reality, so which predictions haven't come to fruition? This question was the driving force for our research into the futuristic part of Artificial Intelligence.

We began by first trying to determine what made someone a futurist and what set them apart from just science fiction writers. For our research, a futurist was someone who has conducted research in the AI field and has written about the possibilities of the future. This was an important first step because there are plenty of sci-fi novels about humanity being wiped out or controlled by a super computer, and we didn't want to incorporate these ideas in our project.

We initially looked at the founding members of Artificial Intelligence, such as Minsky, and some of their predictions.

Eventually we began searching for well-known present day futurists who have made predictions about where Artificial Intelligence is headed. Some of the futurists that we encountered in our research include, Ray Kurzweil, an American author and inventor, and Hugo De Garis.

After finding some futurists to write about, we tried to determine which topics were the most important ones to cover in the futurist field. We decided to cover some prominent ideas such as general intelligence, smart robots and human computer interaction. With each topic, we found futurist opinions and predictions for the future.

With these three topics: general intelligence, smart robots, and human computer interaction; and the experts to support them, we were able to give an accurate summary of where the experts think Artificial Intelligence is heading.

4.3. Survey

4.3.1. Design of Survey

The next step in our project was to prepare the survey. The most important part of a survey is the questions that it contains. The answers to these questions provide the data for our analysis, so it is important that the questions are easily understandable, unbiased, clear, and concise.

To start, we drafted a list of questions that we would like to answer with our survey material. As we drafted these questions, we tried to keep our relationship between the media and the public in mind. This relationship, previously explained in section 3.1 is going to be used to determine if the media has some sort of affect on what the public knows about Artificial Intelligence. In order to understand the public portion of this relationship and satisfy the requirements explained in section 3.2, we drafted the following questions:

1) Do people understand what Artificial Intelligence actually is?
2) Is there a correlation between a person's intake of media (medium and frequency of consumption) and their understanding of Artificial Intelligence?

3) Are people afraid of Artificial Intelligence? Can we correlate this with their media knowledge/habits? When grouped together by age, gender or occupation, do people who consume certain types of media have similar feelings?
4) Where do people think AI is headed in the future?

After we compiled this list, we began to formulate a list of draft questions that would help us answer our initial questions. After we compiled a list, we used the book, "Research: Survey Basics", to help us standardize our terms and provide clear and concise questions. To correctly test our questions, we asked a small group of 3-7 people to answer the questions and provide us with feedback about any problems they had. This practice of question testing and revising continued until we met with a psychology professor on campus. Dr. Skorinko reviewed our survey and provided us with suggestions about how to modify our survey to better allow future analysis.

While the group was developing the questions, we continued to find effective software tools that would allow for us to easily distribute our survey and analyze the results. A number of options were discussed including Survey Monkey, Google Documents, LimeSurvey and custom software (built in house). We eventually chose LimeSurvey because it was open source, extremely powerful and flexible from a survey implementation and analysis perspective. LimeSurvey also allowed for us to have a combined web and paper survey, which was a requirement at one point.

Though LimeSurvey is cross platform, we chose to run it on a server located in a WPI dorm room, separate from the machine hosting our website and document sharing services. The machine was running a distribution of Linux (also open source) which allowed for extensive customization and excellent performance. Additionally, the separation kept the two services (team collaboration and survey) isolated from each other in case any potential problems were to arise. Separating the survey onto separate hardware also allowed for the survey to handle many concurrent users with no impact on load times, with the configuration we used.

Once the survey infrastructure was in place, we took our questions and input them into the survey. With the proper formatting (order, question hints and applicable definitions) and question order we created a test survey (designated beta01) to send out to a small group of individuals. These individuals took the survey and reported what they thought about the survey

setup and questions that were asked. We gathered this feedback, discussed the changes and made the appropriate changes to the survey.

With these changes made we brought the second draft (designated beta02) of survey questions to Professor Skorinko to get her opinion on the survey. She offered a number of suggestions largely about the question types. We were able to include as many Likert scales as possible, for better data analysis. Professor Skorinko also pointed out that having helpful information (such as hints or definitions) underneath the question is better than on the bottom of the survey, were we originally positioned it. These changes were made and incorporated in the third revision of our survey (designated test01).

We gave the test01 revision to a separate group of individuals as a trial to obtain feedback. This produced considerably less feedback than the original two revisions, so the trial survey remained mostly the same. After showing the test01 version to our advisor, we added two questions to help provide a clear link between our three focus areas (experts, media and public). The survey was now in a final state, ready for distribution to a wide audience. We removed all version numbering from the questions in the survey and prepared the software for distribution.

4.3.2. Design of Analysis

As the survey was closing, we began to hypothesize what we wanted to obtain from the collected data. These ideas started by reviewing the answers our survey questions provided. By going through each survey question and respective answer choice(s) we were able to pair answers to show more information. This additional data could prove a correlation between two identifiers (such as age and technical skill) more than one question could. We started out by collecting these query ideas on rough paper form, which through input from our advisor and Professor Skorinko evolved into formal sentence based questions. We referred to these questions as queries. These formal queries we performed to create a picture of what the survey data tells us.

4.3.3 Survey Analysis

After we had formed a complete list of questions that we wanted to answer with our survey results, we spoke with Professor Skorinko about how we were going to go about statistically querying the data. During our meeting, she introduced us to the statistical software,

SPSS, a very powerful and relatively simple to use statistic based program. After she introduced us to the program, she showed how to import our survey data and how to run the kinds of queries that would provide answers to our list of questions.

During the software demonstration, we ran into a few issues that we had not accounted for. The first issue was that our survey had some data that just didn't belong there. We noticed this when we did our first age calculation and we found some ages like 123 and 666. This initial flag actually lead us to really investigate our data and delete the data that wasn't appropriate. This data refining process was extremely difficult because we had to determine what the criteria for deletion was. In other words, did someone who was 89 years old actually take our survey? To determine this, we had to then look at the rest of that person's responses. After our "cleaning up" of the data, we actually wound up with around 419 complete responses.

Another issue that we didn't account for while planning our survey analysis was the statistical significance of our queries. Statistical significance, or the likelihood that a result didn't just occur by change, ended up being a large roadblock for us (StatSoft, 2011).

Finally the last issue we ran into arose when we first tried to run a sample query on the data. The sample query failed because our data was not correctly formatted. In other words, our survey software outputted the answers to some questions as the actual string result from the question. For example we had one question, "Is it possible for human thinking to be replicated in machines?", with the choices, " Yes, Possibly, Don't Know, No". The survey software formatted the responses into strings matching the choices. In SPSS, we had to meticulously format responses like these into numerical values. So for the question above, "Yes" became 0, "Possibly" became 1, "Don't Know" became 2, and "No" became 3. Another aspect of the data that we had to transcode was the age data. This data had many different values so the most effective way to use age for analysis was to group the ages together into predefined groups. For our analysis, we chose an age split of 0-35 and 36 and above. We chose this age split because our age data was skewed to towards the twenties. If we were instead to split the ages in a more traditional way (3 categories or more), we would not have enough data in the higher age ranges.

After our data was refined and we had an accurate understanding of statistical significance, we were able to begin our queries. In SPSS we focused on two types of statistical

methods, cross tabulation and ANOVA. Cross tabulation is a statistical process of creating a table based on the frequency distributions of the variables. “Cross tabulation allows us to examine frequencies of observations that belong to specific categories on more than one variable (StatSoft, 2011). Cross tabulation allowed us to compare the results from two different questions which proved very helpful in analyzing the background questions. Mainly we used crosstabs to compare Males versus Females in various categories like “Do the promises of Artificial Intelligence scare you?” We also compared the age split to many different categories including the types of media consumed.

Next we used the ANOVA method because it compares significance between means. Accoding to StatSoft, an electronic statistics textbook, The purpose of ANOVA or, the analysis of variance, is to test for significant differences between means (StatSoft, 2011). We compared all of our scale-based questions using the ANOVA technique. This included questions about technical background, computer skill, and how many Artificially Intelligent Machines that people interacted with on a daily basis.

Once the raw survey data was refined, we began the process of processing the open ended (text based) response data. While there was initially some discrepancy about how best to process this data, we decided to narrow our focus to two of the four open ended questions. The questions “background08” and “body01-03” were selected because they provided a direct example of an Artificial Intelligence event they were impacted by or could think of, respectively. The respondents answers to these questions helps create the link between the media and the public.

Using the refined data from the two questions (“background08” and “body01-03”) we had to make the respondents answers be uniformly categorized, in order to obtain frequency information. To help gain an overview of the responses we fed the raw data from the two open ended questions selected into a word map generator called Wordle. This generated the most frequently used words in a visual form, so we could see the most popular words found in respondents examples without reading every response.

To refine the data, we normalized the case of the words and removed common words such as “a” or “the” (both tasks are features of Wordle). Then we manually removed approximately 30 additional words for each question that had no relation to Artificial

Intelligence events (for example, “one”, “n/a” and “probably”). This left us with words representative of Artificial Intelligence events. For example, the words “Google” and “cars” were very popular. Both words were derived from the phrase “Google cars” being frequently mentioned in responses. The word maps provided an introduction to the raw data and helped visually display keywords to look for.

With the analysis of the word maps completed, we started working on standardizing the open ended responses. For each of the two questions, we read each response and highlighted the responses that were potential for categorization (such as someone mentioning Google cars or ASIMO). After going through all of the data, we revisited the highlighted items and wrote a category that particular response fell into (if applicable). For example, someone might say “I saw a story about Google developing cars that can drive themselves” as a response for “An example of Artificial Intelligence”. We would take that response and categorize it as a response for Google. The responses with categories assigned to each open ended response were then filtered out from the ones that had no useful data to create graphs.

We created two graphs for the two open ended questions: we used a scatter plot and a bar graph. The first graph was a scatter plot containing the age and frequency of all categorized responses, sorted by frequency and age (least to greatest). The second graph was the average respondent age and frequency of event, sorted by frequency (least to greatest). These graphs provided a breakdown of the open ended responses for the two questions we selected. The data helps show the frequency of events and any affect that age had on respondents writing about that event.

5. Background

5.1 Theoretical and Historical Foundations of AI

The foundations of Artificial Intelligence can be traced as far back as Aristotle and his work on the syllogism. Work in logic has greatly influenced early attempts at Artificial Intelligence, some of which tended to focus on creating machines that reason logically about their environment.

Aristotle's work on logic laid the foundation for what would later be developed by Augustus de Morgan, George Boole and Gottlob Frege (Norvig, and Russell 1995, pp. 8-16).

George Boole was the first person to formalize processes of reasoning symbolically and algebraically. He published his findings in his magnum opus, "The Laws of Thought." His innovations marked the beginnings of a formal treatment of logical inferences (ibid, p.11). His algebraic system, called Boolean algebra, is now the bedrock of modern computing and is used to create the most basic of computational devices (ibid).

Augustus de Morgan was greatly influenced by the algebraic nature of Boole's work. He expanded it by introduced what are now called De Morgan's Laws (McCorduck 1979, 39-40). He published his findings in the book "Formal Logic", in which he also introduced the first formalization of intuitive logical concepts such as "for all" and "some". These concepts, called quantification would later be expanded on by Gottlob Frege in the first full formalization of logical reasoning (Norvig, and Russell 1995, pp. 8-16).

Frege's had an immense influence on two of the fundamental aspects of Artificial intelligence. The first was logic and the second was language. Frege's work on the distinction between the denotation of a word and its connotation, what he called its sense, was one of the foundational analyses of language that greatly influenced modern philosophical analysis of the use of language. His work on logic was the first to create a formalization of logic in a full sense and apply it to formalizing aspects of mathematical reasoning – in particular, the reasoning in arithmetic. This logical perspective would greatly influenced aspects of Artificial Intelligence which sought to create systems that reasoned and solved problems using formal methods.

This logical strand was also influenced by the works of Blaise Pascal, Gottfired von Leibniz and Charles Babbage. Pascal and Leibniz were two of the first Europeans to engineer simple calculating machines.

Pascal developed a machine called Pascaline. It could handle up to 8 digits in performing its calculations. It was restricted in the sense that it could be used only for addition and was not reprogrammable (Lee 1995, p. 537).

Gottfired von Leibniz improved upon some of Pascal's ideas by inventing the Step Reckoner. It was capable of performing multiplication (Lee 1995, p. 440). It did this by using repeated addition.

These developments fermented the notion that at least the higher order aspects of intelligence such as reasoning can be simulated by logical general calculation machine. This idea was best developed by Leibniz in his Calculus Ratiocinator and Characteristica Universalis. Leibniz's basic intuition was that all forms of argument could be encompassed into a single system which would be divided into two parts. The first part would be the Characteristica Universalis, which would be a universal language that could systematically express all ideas with perfect clarity. The second part would be the Calculus Ratiocinator, a general method of performing logical inferences on sentences within Characteristica Universalis. Leibniz was also a very major figure in the development of logic (McCorduck 1979, pp. 33-34). His focus on elementary concepts and fixed rules of inference very much reflects the modern perspective on logic.

Charles Babbage expanded greatly on the initial successes of calculating machine. He came closest to the modern computer (ibid, p. 22). He is best known for his Differential and Analytic Engines. The differential engine performed its complex calculations mainly through subtraction. Babbage called its method of calculation the method of differences - hence the name, Differential Engine.

Babbage's work on computing gave way to the possibility of general computation – the ability of a machine to perform any calculation. His Analytic Engine was profoundly innovative and ahead of his time. It was designed with the capacity to be programmable. Lee remarks that

Babbage “as the inventor of the first universal digital computer, he can indeed be considered a profound thinker” (ibid, 52).

Babbage’s computer inspired Ada Lovelace, arguably the first computer scientist, to comment in 1861 "The Analytical Engine has no pretensions to originate anything. It can do whatever we know how to order it to perform", a judgment that would later be questioned by innovators in Artificial Intelligence.

Babbage’s dream was realized in the modern computer. The modern computer arose mainly out of the research in Germany prior to the Second World War (Lee 1995, 759). The development of programmable machines caused some to realize that they could not only be used for calculation but could be used to manipulate symbols in general. One of the early innovators in computer technology, John von Neumann, performed some of the initial analyses of the human mind and its activities as a form of logical operations (Dyson, 87). The theoretical aspects of computers were expanded upon by British Mathematician Alan Turing.

Turing, an innovator in computer technology himself, performed a fundamental philosophical analysis of intelligent machines and answered several theoretical objections to them (McCorduck 1979, p. 55).

The core philosophical notions of Artificial Intelligence can be divided into two theses – the strong and weak AI theses. The strong thesis purports that a computer can think in the same way that humans think (Penrose 1989, p. 17). The weak thesis contends that computers can at least simulate some aspects of human thinking. One aspect of AI is the notion of symbolism. That is, symbolic manipulation can give rise to intelligent behavior (Newell 1990, p. 111). These notions are very much related to the computational perspective on human cognition.

The computational foundations of Artificial Intelligence have been placed into doubt by the work of John Searle and Herbert Dreyfus. Searle's argument against Artificial Intelligence is perhaps the most famous. It is called the Chinese room argument. Searle envisions himself in a locked room, completely separated from the world. He is then given Chinese characters which he is to translate to their English equivalents. He does this by following detailed rules that were already supplied to him. The idea is that Searle himself does not understand Chinese, but anyone who reads his translations would have the impression that he does indeed understand Chinese

(Penrose 1989, p.18). Therefore Searle argues that rule following is itself not enough to guarantee understanding (ibid, 19). Dreyfus's argument against Artificial Intelligence also rejects symbolic approaches to Artificial Intelligence. Unlike Searle's work his is based more on the philosophy of Martin Heidegger, which treats language as not based on rules and representation (Dreyfus 1993, xvii-xxi). It is from this point-of-view that Dreyfus rejects symbolic AI in favor of a less representational AI.

5.2 Key Contributors and Ideas

Artificial intelligence is a relatively new field of inquiry but, notwithstanding its age, it has managed to produce a wide variety of ideas and approaches to investigating the question of intelligence. As a study, it can be traced to the work of Alan Turing.

Alan Turing did some of the earliest work on Artificial Intelligence. He published one of the earliest papers on Artificial Intelligence in the journal Mind. In it he detailed his now famous Turing test. In this test one has a machine and a human in separate compartments and an investigator, who does not know which is which (Feigenbaum and Feldman 1963, p. 11). The task of the computer is to make the investigator unable to tell who is human and who is a machine.

Turing believed that the capacities needed for such a task would suffice to demonstrate some sort of advanced mechanical intelligence. His test has been a motivating aspect of some Artificial Intelligence research.

Present day Artificial Intelligence also emerged out of early studies of communication and control. These studies were initiated by Norbert Wiener and Claude E. Shannon.

Wiener's work was especially influential to Artificial Intelligence. He founded the discipline of cybernetics. The area of study of cybernetics was to study control and communications both in biological systems and machines. The analogy between machines and animals was crucial for later work in Artificial Intelligence. However, the necessity for a more computational perspective arose when researchers realized the difficulties inherent in dealing with Wiener's work, Cybernetics, with more complex systems (Crevier, p. 28).

Wiener's cybernetics became difficult to use when analyzing extremely complicated systems. This difficulty arose out of its use of complex equations. Some researchers started seeking alternative methods. Artificial Intelligence was one of the results of this search.

The term Artificial Intelligence was by coined John McCarthy at the Dartmouth Conference in 1956 (McCorduck 1979, p. 114). This conference was attended by such AI giants as Marvin Minsky, John McCarthy, and C. E. Shannon. It was this conference that concluded that human tasks can be defined in such a rigorous way that computers can simulate it. These researchers went on to become some of the leading figures in Artificial Intelligence.

Minsky created some of the earliest work in the application of neural networks to problems of Artificial Intelligence. He created SNARC (Stochastic Neural Analog Reinforcement Caluclator), a neural network which could find its way around a maze. Minsky was very involved in the early symbolic/logical approach, but realized the limitations of the approach and changed his view to a more disconnected and complex way of solving the problem of general intelligence.

Minsky's perspective was developed in his book, "The Society of Mind" (Minsky 1988). The basic concept is that the mind is a collection of separate unintelligent "agents", which connect together to form an intelligent creature (Minsky 1988, 17). Marvin Minsky believes that the problem of general intelligence cannot be solved with just one approach but must be tackled from various angles and that the agent-based approach is the best one. He asks rhetorically, "What magical trick makes us intelligent?" and answers "The trick is that there is no trick. The power of intelligence stems from our vast diversity, not from a single, perfect principle." (Minsky 1988, p. 308)

McCarthy created the mathematical description of the LISP programming language, which was later turned into programming languages such as Common Lisp and Scheme. These have since been viewed as the archetype for working with AI since it is very extendable, expressive and allows for very fluid creation of data structure and higher-order procedures and has great symbolic manipulation faculties. In short, Lisp-based languages are useful for the sort of Artificial intelligence that is based on symbolic and rule-based inference.

Lisp is quite influential in Artificial intelligence, and McCorduck notes “LISP, with its offspring, is still the language of choice in most AI Research” (McCorduck 1979, pp. 252-53). McCarthy has been a well-known supporter of common sense reasoning that is supported by well-structured representations and neatly-defined rule-based systems; he tends to take the logical approach to Artificial Intelligence (McCorduck 1979, p. 251).

Shannon worked on an early chess program that was influential in demonstrating the capabilities of Artificial Intelligence. He also developed a working algorithm that could be used to find a path within a maze. His work on Chess was later used by IBM’s Deep Blue supercomputer when it defeated World Chess Champion Kasparov at chess.

There are other figures that did important work in Artificial Intelligence. Allen Newell and Herbert Simon worked on three important AI programs, one on geometry, and another on logic and the last on general problem solving. Their main idea was that thinking could be thought of as rule-based symbolic manipulation by physical systems and it can be replicated by using the right "representations" and rules-of-thumb in a hierarchical structure. Specifically, they said “A physical symbol system has the necessary and sufficient means for general intelligent action.” (Newell and Simon 1976, p.116) The reasons why Newell and Simon advocated rules-of-thumb based processes in reasoning was through a series of studies in which they discovered that their subjects tended to use methods which were not perfect but proved to be useful ways of looking at a problem. This approach to Artificial Intelligence which studied human beings and extrapolated techniques based on such research is now not as widely used by researchers in Artificial Intelligence.

Their approach uses trial-and-error and means-ends analysis. Means-ends analysis (MEA) is a form of problem-solving in which one chooses the tasks necessary to accomplish a certain goal. Newell and Simon implemented a system in which each goal was divided into prerequisites or sub-goals which had to be completed before the given goal was denoted as accomplished. The whole problem solving structure then has the appearance of a tree which is somewhat manageable from a computer scientific perspective. This MEA when used alone approach however, proved to be very limited in its application.

This representational and symbolic approach was challenged by Rodney Brooks upon which he comments “the symbol system hypothesis implicitly includes a number of largely unfounded great leaps of faith when called upon to provide a plausible path to the digital equivalent of human level intelligence” (Brooks 1990, p.1). He is well-known for his work in robotics and his controversial papers on the limits of explicit, symbolic representations. His study of animal behavior (especially animal movement), led him to conclude that much of our basic "cognitive" skills do not really depend on explicit representations, but rely on constant feedback from the environment. His main idea is to have the environment do most of the work since it is the best "representation" of itself.

Another revolt against the symbolic approach to Artificial Intelligence came from David Rumelhart, important for his work in the connectionist point-of-view of cognition, which purports that cognition is not a matter of symbolic manipulation, but is a phenomenon that arises due to the behavior of connected, non-symbolic components, analogous to neurons, that make-up the system (Rumelhart, Ramsey, and Stich 1991, p. 4-5). This connectionist approach later inspired the study of neural networks, which were, in some way, supposed to be modeled on our brains, although the extent to which they do so is very dubious.

Artificial intelligence has yet to be general in nature and it is applied to specialized fields. This specialized approach to intelligence was mainly influenced by Edward Feigenbaum, mainly known for his work on expert systems. These systems found most of their uses in industry and did not do much in solving the general Artificial Intelligence problem. They are still of some use in medical diagnostics and other situations which only require if-then types of reasoning. Feigenbaum's work gave rise to the field known as knowledge engineering, which tries to codify the knowledge of experts.

There are still those, such as Marvin Minsky and John McCarthy, who are looking for a general form Artificial Intelligence. Hofstadter is one of the most influential. He also holds a subtle perspective on AI. Hofstadter, mainly know for his book “Gödel, Escher, and Bach: The Eternal Golden Braid”, in which he espouses contextual symbolic, complex system as the basis for human intelligence. He uses the ideas of Gödel, Escher and Bach to imagine formal, symbolic systems which obtain their intelligence and creativity out of organizations of symbols that create "strange loops" and other hierarchical phenomena (Hofstadter 1977). He is also well-

known for his work on creativity and analogies. Hofstadter's perspective places analogy as the core of cognition (Hofstadter 1995, p. 3). He supposes that high-level perception and analogy making is the core of how human thinking works.

To this day new ideas and paradigms such as Bayesian networks and other statistical approaches are still tried and applied to create intelligent machines and the field moved towards use of more mathematics, especially probability, and away from models of human reasoning.

5.2.1 Initial Expectations and Predictions

The early innovators in Artificial Intelligence made a series of predictions and expectations about the field's future. These remarks and views were reflected by comments in media outlets as well and in academic papers.

In the work of top researchers we see a tendency to promote Artificial Intelligence as a possible way of replacing human labor. For instance, Alan Turing says "about sixty workers, working steadily through fifty years might accomplish the job, if nothing went into the wastepaper basket" (Feigenbaum and Feldman 1963, p. 31). By "job", Turing is here referring to a machine capable of emulating high-level human reasoning.

This comparison between machine and human intellect is echoed by early AI developers such as Newell and Simon. They predict that their efforts in making machines play games like chess "will at last enable us to make the transition from the low-level equilibrium at which man-machine communication now rests to the high-level equilibrium that is certainly attainable" (ibid, p. 66). In short, they believe that their early excursions into machine game-playing will allow them to create machines able to communicate with humans at a level similar to human linguistic communication.

Such predictions from game-playing are extended even further by Samuel in his work on checkers. Samuel predicts, with great certainty, that his experiments make it "possible to devise learning schemes which will greatly outperform an average person" and that these schemes "may eventually be economically feasible as applied to real-life problems" (ibid, p. 95).

Early expectations also touch on simulation of higher-level aspects of human understanding. These expectations derive from research initiated to unveil certain human thought

processes. Two opposing currents flow from this approach, one current extols advanced models of human understanding and another is more cautious about the progress made. These currents range from Newell and Simon's comment "it is often argued that a careful line must be drawn between the attempt to accomplish with machines the same tasks that humans perform and ... processes humans actually use to accomplish these tasks… GPS (General Problem Solver), maximally confuses the two approaches" (ibid, p. 279). And to less audacious claims such as "the most important learning process of all is still untouched: No current program can generate test features of its own" (ibid, p.279) by Uhr and Vossley, which continues on "We can barely guess how this restriction might be overcome" (ibid, p.250).

What is said in research papers is often repeated in news outlets, with some exaggeration. "Steadily, relentlessly the problems facing Artificial Intelligence are being solved. I think we will see progress essentially without limit" says Marvin Minsky in The Telegraph (1973), in an article concerning robots. In another story Mike Smith, an AI researcher muses "No robots are as intelligent as the ones you see in movies... That's decades away" (Boca Raton News, 1974).

However, this tendency to predict on a grand scale does not always fare well for researchers. A story in Lodi News-Sentinel ran a quote from Minsky which had him saying "In three to eight years we will have a machine with the general intelligence of an average human being" (Lodi News-Sentinel, 1970). Minsky then supposedly goes on to mention that such a computer would "be able to read Shakespeare, grease a car, play office politics, tell a joke, have a fight" (ibid). Marvin Minsky flatly rejects ever making these comments saying "I never said anything like that. We just don't predict in this business" (ibid).

Some researchers are more cautious in their predictions. John McCarthy jokingly remarks that in order to achieve human level intelligence in AI "we need 1.7 Einsteins and five Faradays and 3 of a Manhattan Project" (Palm Beach Post, 1977). The comments also change over different decades in Artificial Intelligence, as evidenced by Nilsson remark "for true AI, it may be 50 years or so before we do something really profound" and modifies this further by noting that technical issues "may make it 100 years or never" (Miami News, 1983). However, it seems that Nilsson's human level intelligence quandaries do not stop the development of "a Hal – a computer that can engage in conversation. Maybe we'll have that by the year 2000." He also

comments that 20 or 30 percent of the knowledge-based industry will be unemployed after the beginning of the 21st century (ibid).

In the 1980s grand claims stopped as AI was brought to a sober reality. This is evidenced by two news reports. In the Gainesville Sun on January 4, 1986 Hendrix comments "there is backlash of disappointment" and that even previous optimists "are wondering if we can make them [computers] do everything." Another report, this time in 1988 shows an even starker picture, painting a sober picture of the AI industry. Fred Luconi comments "we underestimated how long it would take for market acceptance of Artificial Intelligence products." The article then goes on to say "many other small vendors also misread what some now say is not even a market."

5.2.2 Early Criticisms of Artificial Intelligence

The Artificial Intelligence community has been marked by grand claims. These claims can be seen in the earliest of papers within Artificial Intelligence. Tim Menzies notes that "Just like the dot-coms in the late 1990s, this AI boom was characterized by unrealistic expectations. When the boom went bust, the field fell into a trough of disillusionment that Americans call the AI Winter." (Menzies 2003, p. 1)

In "What Computer Still Can't Do", Herbert Dreyfus, an early critique of the successes and failures of Artificial Intelligence, charts a controversial perspective on the achievements and failures of Artificial Intelligence and what they imply about the fundamental assumptions of the field (Dreyfus 1993). He states "my general thesis will be that the field of Artificial Intelligence exhibits a recurring pattern: early, dramatic success followed by sudden dramatic failure" (Dreyfus 1993, p. 85).

Dreyfus offers examples of early exuberance in Artificial Intelligence work. One paradigmatic case that he considers is the quest for a chess playing machine by AI researchers. This quest starts from the work of Claude E. Shannon, who provided perhaps that first algorithm for creating a machine that can plausibly play chess. Alan Turing also proposed creating chess programs as an example of a possible starting point in Artificial Intelligence research. Dreyfus criticizes and dismisses early work in AI on chess as grossly exaggerated and berates it as overhyped. However, a different perspective on this matter is provided by McCorduck in

"Machines Who Think". In this work she interviews Herbert Simon, one of the workers on the chess program that Dreyfus criticizes so sharply. She also interviews Marvin Minsky, who supports Simon's response. Simon's contends "we just underestimated two things: first how little, how few man-years would go into this; and second, how much very specific knowledge had to get poured into it" (McCorduck 1979, p.220). Minsky supports this view and believes that if more people were working on the problem, more substantial work would have been accomplished (ibid).

Dreyfus also criticizes early work trial-by-error and means-ends analysis. This work was initiated by Simon and Allen Newell. Dreyfus notes the overly ambitious proclamations by the collaborators which include the statement "fragmentary evidence we have obtained to date encourages us to think that the General Problem Solver provides a rather good first approximation to an information processing theory of certain kinds of thinking and problem-solving behavior" (Dreyfus 1993, p. 93). They then go on to add "the processes of 'thinking' can no longer be regarded as completely mysterious" (ibid).

While analyzing Marvin Minsky's work, Semantic Information Processing, Dreyfus centers his critique on three programs, Daniel's STUDENT, Evan's ANALOGY, and Quillian's semantic memory program. Daniel's STUDENT is programmed to solve algebraic word problems on the high-school level. Evan's ANALOGY program is intended to resolve analogy puzzle problems often found on IQ tests while Quillian's semantic memory program which self-descriptively is meant to model how human beings encode meaning. Of these programs Dreyfus makes the claim "the current approach is characterized by ad hoc solutions of cleverly chosen problems, which give the illusion of complex intellectual activity" (Dreyfus 1993, pp. 131-132).

The pattern that Dreyfus proposes is that the student makes a modest by somewhat audacious proposal of the task that their program performs and Marvin Minsky supposes their work applies or can be extended to more complex aspects of thinking. The example of Daniel's STUDENT is most telling. Daniel describes his program as providing a way of "understanding" English in a very restricted domain framework. Daniel makes it very clear that his program does not understand English in general but "understands a subset of English if it accepts input sentences which are members of this subset and answers questions based on information contained in the input" (Minsky 1969, p. 146). On the other hand, Marvin Minsky, as quoted by

Dreyfus proclaims, that Daniel's work is "a demonstration par excellence of the power of using meaning to solve linguistic problems" (Dreyfus 1993, p. 132). Dreyfus adds that "Minsky devotes a deal of his … article to Bobrow's program and goes so far as to say that "it understands" English" (ibid).

The critiques of Artificial intelligence, both external and internal, compounded by the quickening absence of funding in the field, lead to a period of stagnation in AI research and funding in the 80s. This period is known as the AI winter. A few events lead to this result. The first were the reports by James Lighthill and ALPAC (Automatic Language Processing Advisory Committee).

James Lighthill's report on Artificial Intelligence was originally titled "Artificial Intelligence: A General Survey". It was requested by United Kingdom's Science and Engineering Research Council. It caused a major uproar in the Artificial Intelligence community upon its publication. It was greatly critical of Artificial Intelligence as a whole.

The Lighthill report made its argument by dividing Artificial Intelligence into three categories, A, B and C. Category A is labeled advanced automation or applications. These activities are mainly applied but can also serve for simple research (McCarthy and Lifschitz 1990, p.64). In category B are researches into building robots. He characterizes this work as in some way providing for an outlook on robotic behavior that is not specific to some application but can behave in a way suiting an intelligent agent. The last category comprises the study of systems that replicate the behavior of the human central nervous system. Category B is deemed as a sort of bridge between Category A and Category C (ibid).

The report argued that advancements in Artificial Intelligence were geared towards creating robots that exhibited general behavior that was not specific to a certain application. However, he reported that such a goal is at such a far off distance that the expectations within the community are unrealistic. Lighthill regards the problems solved by the robotic applications of his day as dealing only with the simplest of environments and highly inflexible in nature. He concludes by judging that the Artificial Intelligence should focus on particular applications.

Experts in Artificial Intelligence did not stay quiet with these reproaches. One notable response was by John McCarthy. McCarthy argued that Lighthill's report was largely irrelevant

to Artificial Intelligence as it was practiced by most of the community. He noted that Artificial Intelligence is dedicated to "studying the structure of information and the structure of problem solving processes independently of applications and independently of their realization in animals or humans" (McCarthy and Lifschitz, p. 64). Thus Lighthill's focus on robots and neurophysiologic applications and theories was unimportant to the goals of Artificial Intelligence. Nevertheless, the Lighthill report we greatly responsible for the diminishment of AI research in the United Kingdom (Menzies 2003, p. 19).

The ALPAC report, sponsored by the United States government, had a likewise negative impact on AI research in the United States. In "ALPAC: the (in)famous report" John Hutchinson says that ALPAC's "effect was to bring to an end the substantial funding of machine translation research in the United States for some twenty years" (Hutchinson). The report surveys the field of human translation and looks at how machines play a role in government translation. The report concluded that general research in Machine Translation was, overall, of little value to translation work. Hutchinson notes that Machine translation "quality was undoubtedly poor, and did not appear to justify the level of financial support it had been receiving" (ibid).

A second reason for the reduction in AI was the internal self-criticism of the Artificial Intelligence community. One of the problems that occurred is that researchers started to diminish the work of expert systems. They berated them as not being true Artificial Intelligence systems. Furthermore, Marvin Minsky and Seymour Papert wrote a critical review of the research in perceptrons, a once important subfield of AI. This more or less placed a freeze on that segment of Artificial Intelligence which would not pick up until the discovery of back-propagation.

These factors combined to form a period ranging in the late 1980s and early 1990s in which AI research reduced greatly in funding. These reductions were also preceded by great hype. There are some who speculate that these same factors that lead to the first AI winter will also be in motion to this day.

5.3 Approaches to and Subfields of Artificial Intelligence

5.3.1 Divisions of Approaches

Artificial intelligence can be approached in a variety of ways. Over time certain perspectives have come to dominate the thinking in Artificial Intelligence. These perspectives are seen by some as inherently opposite and have their adherents, while others see them as complementary and necessary in creating sufficiently intelligent systems.

Symbolic Approaches

One of the better known and widespread of perspectives in Artificial Intelligence is the symbolic perspective. This perspective on Artificial Intelligence supposes that intelligence can be modeled by applying rules and symbolic manipulation to efficient representations. It is well-championed by such people as Herbert Simon and Allen Newell, as well as John McCarthy.

Symbolic, rule-based approaches are often labeled GOFAI (Good-old Fashioned AI) (Russell, and Norvig 1995, p. 153). Marvin Minsky characterizes the strength of symbolic approaches as possessing "expressiveness and procedural versatility" (Minsky 1991, p. 38). However, he also notes the inflexibility present within symbolic systems since they tend to rely on rigidly defined rules.

Symbolic approaches are heavily used in expert systems and form the core of traditional approaches to Artificial Intelligence.

Connectionist Approaches

Connectionist supporters oppose the symbolic approaches. They regard the core of intelligence as not inherently requiring explicit symbolic representations and rules to manipulate representations, but instead as networks of relationships between different entities that produce an overall intelligent effect.

The behavior of connectionist networks tends to be more difficult to predict. Unlike most symbolic Artificial Intelligence applications, connectionist applications tend to require training. They also tend to be more difficult to analyze into general principles. A recently popular example of this approach is a way of creating intelligent behavior by mimicking basic neural principles through entities called neural networks.

However, the symbolic and connectionist approaches are not in complete opposition to each other. There are groups within the Artificial Intelligence community who look at the advantages and disadvantages of both approaches and combine them into mixed systems that unite them into more useful systems. Marvin Minsky proposes the necessity for "systems that combine the expressiveness and procedural versatility of symbolic systems with the fuzziness and adaptiveness of connectionist representations" (Minsky 1991, p.38).

5.3.2 Subfields of AI

Artificial intelligence has over the years divided into certain subfields, each exploring either a certain facet of intelligence or a certain method of solving problems intelligently.

Expert Systems

In a report on Artificial Intelligence, Edward Feigenbaum and Robert Engelmore define experts systems as AI programs "that achieve expert-level competence in solving problems in task areas by bring to bear a body of knowledge about specific tasks" (Feigenbaum 1995, p. 6). Edward Feigenbaum was one of the inventors of expert systems. Expert systems are useful for solving specialized tasks, typically handled by experts, that can be rendered explicitly into rules.

In creating some expert systems, a knowledge engineer – an individual whose job is to extract information from the expert – meets an expert and attempts to formalize the expert's knowledge. The rules that the expert elaborates are then added to the system and used to make a variety of decisions based on user input.

They have been used in applications ranging from law to medicine. One such application is in Computer-aided diagnosis. This medical application of expert systems has been widely used in medical imaging technology (Russell, and Norvig 1995, p. 23).

Bayesian Networks

Bayesian networks are a very recent addition to the Artificial Intelligence arsenal. They are an attempt to apply probability theory to problems of Artificial Intelligence (Russell and Norvig 1995, p. 54). Based on the groundwork of a Presbyterian Minister, Thomas Bayes, the core idea behind Bayesian networks is to use known probabilities to compute unknown but dependent probabilities. They are termed networks because the relationships between the variables in the Bayesian network form an interconnected graph of probability (ibid, p. 520).

This graph can be used to represent such relationships as causality and chains of arguments. Bayesian networks find applications in fields ranging from medical diagnosis to vision processing.

Machine Learning

Machine learning is a subfield of AI that uses techniques ranging from Bayesian networks to neural networks to evolutionary algorithms in order to create a machine that learns a specific task. The applications of machine learning are various. They range from natural language processing of syntax to computer visual perception. Machine learning is very useful for extracting patterns out of data and for general pattern recognition (Russell and Norvig 1995, p. 2).

Neural Networks

Neural networks have had quite a long history. The first neural networks were designed by McCulloch and Pitts (Russell and Norvig 1995, 44). They initially used the idea of a threshold (a point of activity over which a neuron fires), which could be easily used to create logic gates, to implement neural networks. These initial successes led to the creation of the perceptron, a three-layered neural network that could perform some simple computations.

However, this series of successes was not to last for long. Marvin Minsky and Seymour Papert later demonstrated the limits of the perceptron and hypothesized the weakness of generalized perceptrons (McCorduck 2004, pp.106-107). This led to a temporary collapse of research within the field. However, Neural Networks have regained popularity and are now becoming more widely used. The core idea behind neural networks is the notion of a neural unit that is connected to other units and that activate given a certain threshold. Neural networks were initially designed to be somewhat faithful to biology, even if abstractly so. They solve problems by learning from specific examples. They find application mainly in fields requiring some form of pattern recognition.

Natural Language Processing

Natural language processing is the study of algorithms that are able to manipulate and comprehend human languages. There are several methods used within this field. Some popular ones are statistical methods, which sample corpuses of work and build information that can be

used to infer relevant information. This form of natural language processing is closely allied to Machine Learning, another subfield of Artificial Intelligence. Another approach to natural language process is based on gathering common sense information, which is then used to comprehend written sentences. Natural language processing can be applied to problems of translation, speech recognition, and the popular Chatter bots, such as famous Eliza system.

Eliza was one of the earliest examples of language processing using techniques in Artificial Intelligence. It was created by Joseph Weizenbaum, who invented it to demonstrate the simplicity of one approach to psychological analysis.

Recently, natural language processing has begun to employ statistical methods. These new tools require large bodies of linguistic data. The statistical methods are used in this process to extract patterns of language use, including grammar. Google's translation tool is a hallmark of the statistical approach to machine translation of natural language. Natural language processing is often thought of as being one of the ultimate tests of Artificial Intelligence since its successful implementation means solves Turing's imitation game.

Distributed Artificial Intelligence

Distributed Artificial Intelligence is a subfield of AI that approaches AI from an agent-oriented perspective. It envisions problem-solving and comprehension as interactions between multiple independent components (agents). This perspective is counter to the traditional approach in which "an agent evolves in a static environment" and engages in "gathering information, planning, and executing some plan to achieve its goal" (Chaib-Draa, Moulin, Mandiau, and Millot 1992, p. 35). Instead of this form of cognition, Distributed Artificial Intelligence attempts to look at cognition as dependent on an environment of multiple agents. It argues that "we must plan the activities of [an] agent while keeping in mind the other agents' activities that can either help or hinder him"(ibid).

Fuzzy Logic

Fuzzy Logic can be divided into two parts. The applications of vague modes of reasoning usually in manufacturing and control processes and the study of logical systems that use more than two truth values (system of reasoning in which statements can be more than just true and false). Fuzzy Logic was developed as a way of coping with the ambiguity of language. Long

seen as a disadvantage of language, ambiguity is often seen by researchers in fuzzy logic as a useful tool that can be used to deal with the complexities of the real world.

Perhaps the most striking feature of Fuzzy Logic is its tendency to use common words in describing problems to be solved. Thus Fuzzy Computation tends to be a sort of soft computation that can allow for the vagueness of human reasoning by being able to withstand the ambiguity of basic logical terms in human language. Fuzzy Logic has been most heavily applied in manufacturing processes where it does a better task of dealing with the approximate intricacies of the tasks at which traditional logics fail.

Knowledge-Based Systems

Expert systems are only a specific subclass of the more general knowledge-based systems. The purpose of these systems is to use a great amount of information to perform sophisticated forms of inference. One example of a knowledge-based system is the project Cyc, a work of Doug Lenat. The idea behind Cyc is to amass an astonishing amount of common sense information, encode it in a large database as a collection of propositions and then uses forms of reasoning to make certain conclusions about given queries (McCorduck 2004, p.489).

The field of Artificial Intelligence has diversified over time and, like most fields of inquiry, will most likely continue to specialize. The question is whether this trend is helpful towards the goal of achieving general intelligence or if the fields must someday be unified.

6. Current Information

6.1. Where Artificial Intelligence is

The media is the only significant link between Artificial Intelligence and the public. With this power, the media essentially controls what the majority of the population hears about Artificial Intelligence. No one expects a highly technical topic like Artificial Intelligence to be extensively covered by mainstream media. However, one would expect groundbreaking events to appear in media coverage. Condensed slightly, the real question remains—does the media coverage accurately measure what is happening in Artificial Intelligence?

Over the past four years (2006 – 2010) there have been many significant accomplishments in Artificial Intelligence.

The media links the many companies and research laboratories that do extensive work in Artificial Intelligence to the general public. Typical stories that the media picks up on usually contain some kind of impact on the general public, or have a significant "wow" factor. This leaves a large portion of other Artificial Intelligence work outside the public spotlight. This could be due to the lack of technical understanding and insight to deem work impressive or the absence of a press release.

The companies behind the work may be related to the amount of coverage their work receives. It seems that a majority of coverage has a large company behind them. This could be telling of the quality of work these companies fund or be simply an easy target for media representatives looking for new stories.

6.1.1. Current Media Coverage

The following stories have been picked to represent the best of the Artificial Intelligence research conducted over a two term (fourteen week) period. Each summary is a condensed collection of facts about a particular story. The summaries are meant to be informative and easy to digest. We have included them based on the volume of articles generated by the stories and the profound impact they hold. We have ordered the stories by the potential impact as judged by this project group, from greatest to least.

Robots Now Guarding Nevada Nuke Site

This article describes a new robot patrol vehicle that has recently been deployed to guard the Nevada National Security Site (NNSS). The NNSS was the testing ground for thousands of nuclear weapons during the cold war era and is still an active base today. This vehicle looks like a small Hummer and has a number of advanced sensors to assist when it goes on patrol. Riding through predetermined paths, the Mobile Detection Assessment Response System (MDARS) can help detect intrusions and alerts humans when the situation arises. The MDRAS deployed recently has no configured weapons, but similar vehicles have been tested with automatic weapons. This robotic vehicle relies on Artificial Intelligence to make decisions about when a detection has occurred and escalate the situation to human guards. The sensors look for everything from broken locks to a moving intruder. This MDRAS promises to save $6 million in infrastructure costs by not having to utilize towers, cameras, or lights, for example. On top of that, it saves $1 million annually by directly eliminating equipment maintenance and protective force costs (Shachtman, 2010).

Letting the Machines Decide

On Wall Street, it seems humans still can't learn from their mistakes—which has led to an increasing amount of development in artificially intelligent systems. These systems take in massive amounts of data every hour, such as data about stock trades, and make predictions. These systems attempt to take raw data and learn from them, enabling humans to make better decisions than previously possible. In a matter of seconds, a computer can analyze previous prices dating back 30 years. Combine that with the use of metrics such as price-to-earning ratio or interest rates, these programs take massive amounts of data and make decisions when they believe the time is right. When the computer is wrong, the system adjusts the strategy and learns from the mistake. This neutral approach would be near impossible for humans due to the biased nature—or because a stubborn investor only utilizes one strategy at a time (Patterson, 2010).

Google Autonomous Cars

At Google a team of fifteen engineers are developing artificial intelligent software that is capable of driving cars. The team has outfitted six Toyota Prius sedans and an Audi TT with a wide variety of sensors to help make the driving programs aware of their surrounding environment. Sebastian Thrun, director of the Stanford Artificial Intelligence Laboratory, leads

the project at Google. Thurn also mentored a group of Stanford students who won the DARPA grand challenge in 2005 with their autonomous car named Stanley. The Google cars have logged over 150,000 miles on-road with little human intervention. To gain control of the car, the (human) driver can move the steering wheel, tap the brake pedal or hit a red button on the right portion of the dashboard. While in autonomous mode, the cars announce changes such as "approaching crosswalk" or "turn ahead" to keep humans well informed. Additionally, any suspected malfunctions in the sensors will be announced to the driver. The cars have two modes— aggressive, that, for example, will not yield to other cars while merging or cautious, where the car will yield to other cars. It is widely speculated that Google may plan to use these cars for automating Street View capture. Coincidentally (or not), Sebastian Thrun is also credited as the co-founder of Street View (Markoff, 2010).

No command, and control

BAE Systems, a British defense contractor, Imperial College and the universities of Oxford, Bristol and Southampton are collaborating on a system called ALADDIN. ALADDIN stands for Autonomous Learning Agents for Decentralized Data and Information Networks. The idea behind ALADDIN is to have drones serving in the line of defense to actively collect and exchange information with each other. This exchange of information would allow for strategies to be refined actively. Redefined strategies would theoretically be outsourced to central computers that could apply unbiased logic and reasoning to create the best strategies. Currently the groups have focused on disaster rescue situations, which are not unlike the battlefield. Currently ALADDIN utilizes algorithms that incorporate game theory, probabilistic modeling and optimization techniques. Another focus of ALADDIN is optimization of resources— allowing no physical resource (such as an ambulance) go unused during a time of need (Economist, 2010b).

What Is I.B.M.'s Watson?

In February 2011, the latest supercomputer from International Business Machines (IBM) will take stage with two champions from the game show Jeopardy!. Three years in the making, the machine is named Watson. Watson can decipher Jeopardy! questions and produce a reliable answer within a matter of seconds. The natural language processing is able to decipher questions and reword them into answers appropriate for Jeopardy!— for example prepending "What is"

when appropriate. Watson is not connected to the internet and relies on documents stored "in its brain" like any other Jeopardy! contestant. The stored material consists of books, reference material, dictionaries, thesauri, taxonomies, folksonomies and encyclopedias to name a few. The natural language processing techniques Watson employs are not necessarily groundbreaking—however the speed and power of the system is. For determining the answer to questions, Watson employs over one hundred algorithms. A different set of algorithms will compare the answers produced by individual algorithms and infer answers. If, for example, many different algorithms produce the same answer Watson will favor that answer over others. Watson produces a large number of correct answers for each question and chooses the answer based on how confident "he" is. This technique is contrasted to many previous attempts that rely on one algorithm for everything. Another important algorithm Watson relies on is cross-checking facts. If an algorithm produces an answer for a journalist in 1594 with someone who has someone who has a birthdate of 1899 for a journalist in 1594, this answer would be ruled out because that journalist would not have been born. Audience members can see the potential answers Watson selected along and how confident Watson is that the answers are correct. Watson is given the question as soon as it becomes visible on the screens facing the contestants. Watson is programmed to hit the buzzer once it is confident with an answer. The technology behind Watson can be applied to many different industries and help propel automated (or computer assisted) service to a new level. For example, in a hospital, doctors would provide Watson with medical papers and in a time of need (such as a critical emergency room decision) "he" should produce a reliable answer to any question a doctor might have (Thompson, 2010).

Avant-Garde Music Offers A Gateway to Artificial Intelligence

Researchers at Rensselaer Polytechnic Institute are working with human musicians to create a digital conductor based on Artificial Intelligence. To conduct music by itself, the digital conductor must have a high level of reasoning skill. Because Avant-Garde music is very unpredictable, the conductor needs to employ elements of cognition, perception, reasoning, decision-making, memory and planning to make decisions on the fly. The three primary researchers formed a group they call "Triple Point" that serves as the performance laboratory for the project. Since the style does not fit into a typical genre, the challenge of creating a properly functioning digital conductor is much greater. The conductor accepts pitch, rhythm, volume,

texture, density and timbre as parameters to help fully understand the musical structure. The conductor will be able to give feedback to musicians indicating if improvisations are working and if not, how to improve the quality of music. The project is based on a prior project that created a virtual accompanist to the trio's music (RPI, 2010a).

A Robot's Body of Knowledge

A group of European researchers have built a robot called ARMAR-III that learns from instructions and by touch. Combined with occasional instructions from a human coach, ARMAR-III forms a representation of objects through manipulation. The idea of learning by touch is also known as embodied cognition and is not unlike how children learn about the world around them. Embodied cognition requires the coordination of the robots sensors— for example, hands and eyes (camera). When ARMAR-III comes across a task it doesn't know how accomplish, it builds a library of actions until the higher-level processor can find a solution. Some of the early tests have been for ARMAR-III to identify a misplaced cereal box or to order cups by color on a table. ARMAR-III's capabilities are broken down into three distinct tasks: understanding (verbal) instructions, creating representations of objects or actions and figuring out how to execute those instructions. The true strength of ARMAR-III is the ability to combine sensory information with planning and stored knowledge. This allows ARMAR-III to tackle complex problems that are otherwise extremely difficult for Artificial Intelligence (Laursen, 2010).

Artificial Intelligence Helps Diagnose Cardiac Infections

Researchers from the Mayo Clinic make the claim that "teachable software" designed to emulate the human brain could help diagnose cardiac infections without an invasive exam. The software utilizes an "artificial neural network" that mimics cognitive functions, to react differently based on the situation. In order to prepare the neural network to handle decisions, researchers would input knowledge and training (experience) to the system. This software could save the need to undergo expensive procedures in order to determine diagnoses with a high level of accuracy. Testing has been done with data collected from 189 patients with endocarditis between 1991 and 2003. The software was able to diagnose with a confidence level greater than 99 percent (ScienceDaily, 2009a).

Texas profs use AI news-ware to ID terror groups

A group of Texas professors have created a computer program that scans news reports and can identify which terrorist group is behind an attack. The program makes an informed guess based on a number of parameters including weaponry utilized, target and tactics. Utilizing a large database compiled from the Institute Study of Violent Groups (ISVG) at Sam Houston State University. The program was tested on a number of recent terrorist attacks in 2009. For example, the program accurately identified the group behind terrorist attacks in Mumbai as Lashkar-e-Tayyiba before intelligence agencies were able to (Page, 2009).

Artificial Intelligence: Riders on a swarm

Marco Dorigo, a researcher at the Free University of Brussels has pioneered a field called swarm intelligence. Swarm intelligence takes its name from ants working in a colony. While a single ant cannot contribute much to a colony, that ant being a part of a colony makes every ant in the colony collectively stronger. Starting in 1992, Dr. Dorigo began developing Ant Colony Optimization (ACO). ACO looks for a solution by simulating ants looking for food. When returning with food, a strong scent (pheromone) is left behind for others to follow. Because the scent disappears over time, this leads to optimized paths to food sources. Dr. Dorigo and his team are able to solve complex logistical problems by using this method and are in currently use by companies. A number of European distributers use AntRoute to manage daily deliveries. AntRoute takes about 15 minutes to produce the routes for 1,200 trucks with many variables that change daily. These ant algorithms have been applied to the problem of routing packets through IP based communication networks, to help produce the best routes (Economist, 2010b).

EU funding 'Orwellian' artificial intelligence plan to monitor public for "abnormal behaviour"

With rapid deployment of CCTV cameras in European cities, and criminals turning to the internet to communicate, Project Indect looks to pick out abnormal behavior from massive amounts of information. Avoiding the information overload problem is so important that the European Union is putting £10 million of funding towards the project. Project Indect works by having autonomous agents scour information on websites, forums, file servers and peer-to-peer networks. These agents are looking for specific information that may indicate threats or abnormal behavior. The true task of Project Indect is to develop “computational linguistic techniques for information gathering and learning from the web”. The idea is to extract the

wealth of information publically available on the internet and mine out relationships, sentiments and words that may correlate with criminal activity. A separately funded project called Adabts focuses directly on behavioral analysis of CCTV cameras. The system attempts to detect abnormal movements and the pitch in voices. Both projects are part of a movement to openly share information between European law enforcement agencies (Johnston, 2009).

NASA Funding Air Turbulence Prediction System

NASA is funding a project that aims to provide pilots flying transoceanic flights with routes around turbulence or storms that may threaten the safety of flight. Scientists are working to apply Artificial Intelligence to satellite imagery and computer generated weather models of ocean conditions. While pilots have access to satellite imagery, it lacks any turbulence information or the detail that land-based flights get. The program utilizes an Artificial Intelligence technique called random forests. Random forests work by creating a series of yes or no questions on how a storm may behave and the potential impact to pilots. This new system will undergo live testing beginning this year (2011) (Gage, 2009).

AI Spacesuits Turn Astronauts Into Cyborg Biologists

A research team from the University of Chicago, led by Patrick McGuire, are developing digital eyes that are capable of seeing what human eyes cannot. This system would accompany a human during exploration. Testing is currently being performed with custom suits with vision enhancement (not unlike suits used today for spacewalking). There is a computer mounted inside the back of the suit and an array of cameras and sensors on the front. McGuire's research was guided by the inherent human nature element of exploring what appears to be different. The system is powered by a neural network that compares incoming data (that varies by sensor) and identifies data that seems unusual. McGuire's system has already successfully identified lichen (small composite organisms) from surrounding rock in tests conducted in Spain. The teams used handheld microscopes and cellphone cameras to relay images to netbooks running McGuire's neural network. In the tests, lichen was identified using color data to find specific patterns. Current plans include analysis that is capable of finding more complex textures. The projects goal is to apply similar identification techniques for exploration on Mars and other planets (Keim, 2009).

6.2. Where Artificial Intelligence is going

6.2.1. Expert Predictions: Futurists

The goals of Artificial Intelligence have been the major driving force of AI since its inception at the Dartmouth conference (Crever, 1993). Since this conference, the Artificial Intelligence community has had a tendency to make predictions about where the field is going and what the future holds for the AI world. These predictions have not only affected the field internally, in fact, these futurist predictions have also had a major impact on the media. In Artificial Intelligence, a futurist is someone who has conducted research in the AI field and has written about the possibilities of the future. The purpose of this section is to explore how these futurists and their predictions have changed the media's understanding and coverage of Artificial Intelligence.

As with any scientific field, Artificial Intelligence has been divided because of experts and their opinions. Over the years, AI was extremely fragmented because of these varying views. To better understand where these differences lie and how this may affect the media's coverage and eventually the public's view on Artificial Intelligence, this section will cover some of the major futurist views in AI.

6.2.2 General Artificial Intelligence

One very popular view that many futurists hold is the idea of general or strong Artificial Intelligence. General AI is defined as a property of any artificially intelligent agent that not only acts intelligently but also actually thinks (Russell, 2002, pp 947). The second part of that definition is extremely important because it points out that merely simulating thinking is not actually thinking.

The idea of general intelligence has been evolving since Alan Turing first formulated the Turing test. Today, it is a popular topic among futurists because of the possibilities that would arise from such a discovery.

Some of the major believers in the eventual creation of general Artificial Intelligence include Ray Kurzweil and Hugo De Garis. While each of these futurists have mentioned that they are believers in general AI, each has their own ideas about when and how general AI will come to fruition.

Ray Kurzweil is an American author and inventor, known for his predictions about the future of technology, particularly Artificial Intelligence (Kurzweil, 2009). Kurzweil has seen worldwide fame mainly because of his predictions that have come true. In his books, Kurzweil discusses many predictions that center around particular discoveries or scientific breakthroughs. In his first book, *The Age of Intelligent Machines,* he predicts things such as the growth of the Internet and the defeat of Kasparov in chess (Kurzweil, 1992). His next book, *The Age of Spiritual Machines*, is broken up into sections based on the times at which his believes his predictions will occur (Kurzweil*,* 2000).

Kurzweil predicts that by 2029, the first computers will pass the Turing test, thus achieving the earliest form of general Artificial Intelligence. By the 2030s, Kurzweil predicts that humans will begin interacting mentally with computers, as he calls it, “mind-uploading”.

Finally, Kurzweil surmises that by the end of the 2040’s, it will be impossible to tell the difference between humans and computers, meaning that “the singularity” has been reached (Kurzweil, 2009). According to Kurzweil, the singularity will occur with the technological creation of super intelligence. He alleges that after this singularity, the world would be unpredictable to humans due to an inability of human beings to imagine the intentions or capabilities of super intelligent entities (Kurzweil, 2006, p. 135-136). This prediction has some of the most important implications for humans because once this singularity is reached, humanity and the universe will change forever.

Hugo De Garis is another well known Artificial Intelligence researcher. As a futurist, he is known for his predictions about effects that general Artificial Intelligence will have on the world. He believes that as Artificial Intelligence technology becomes more and more advanced, a war will develop between humans who oppose and humans who embrace this technology. He has written extensively on this topic and in his book *The Artilect War: Cosmists Vs. Terrans,* he begins by explaining who will be on each side of the conflict (De Garis, 2005).

De Garis believes that eventually the human race will be divided into 2 or possibly 3 groups based on their beliefs about the growth of the artilects, a shortened form of 'artificial intellects' (De Garis, 2007). In an interview with Machines Like Us, De Garis explains the division more clearly:

> I foresee humanity then splitting into 2 (arguably 3) major philosophical groups, a) the Cosmists (in favor of building artilects), b) the Terrans (opposed), and c) the Cyborgists (who want to convert themselves into artilects by adding components to themselves, i.e. by becoming "cyborgs" (cybernetic organisms)) (De Garis, 2007).

According to De Garis, the Cosmists will view their work as "god building", where as the Terrans will fear being exterminated by the artilects, who might look on humanity as a grossly inferior pest. The Cyborgists will argue that the Cosmist-Terran conflict can be avoided by having human beings themselves become artilects (De Garis, 2007).

6.2.3 Smart Robots

Smart robots are another popular topic for futurists because of the social impact that may result from their growth in popularity. Smart robots can be classified as one possible implementation of general intelligence. In this case, researchers would use robots as the bodies for the artificially intelligent brains.

Many futurists mention smart robots in their predictions about general intelligence because of the differences between a computer that has achieved general Artificial Intelligence and a robot. One of the major differences is simply the physical aspect. Instead of an in-animate object like a computer, plugged into a wall inside a building somewhere, a smart robot could be walking down the street or even working alongside humans.

Eric Horvitz, one of Microsoft's leading researchers, has become rather well known because of his interest in these smart robots. His interest in this field has also allowed him to bring these issues to a larger stage, namely, the Association for the Advancement of Artificial Intelligence (Cronin, 2009). In 2009, the AAAI held the first meeting that focused primarily on the negative and positive effects of Artificial Intelligence. At this meeting, one major concern was the idea of self-replicating, smart robots that had surpassed human intelligence.

Tom Mitchell, a computer scientist at Carnegie Mellon University, also has an interest in these smart robots. In an article discussing the report from the AAAI, Mitchell gives his views on smart robots. According to Mitchell, we don't have to worry about machines taking over the world; instead we should worry about intelligent viruses that could put themselves on cellphones, laptops, cars, or anything else (Cronin, 2009).

On the other hand, David McAllester, a computer scientist and professor at the Toyota Technological Institute in Chicago, believes that it is inevitable that fully automated intelligent machines will be able to design and build smarter, better versions of themselves. He acknowledges he's in the minority among his peers (Cronin, 2009).

6.2.4 Human Computer Interaction

Another field that interests many futurists is the field of human computer interaction. Human computer interaction, or HCI, is defined as the discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them (Hewett, Baecker, Card, Carey, Gasen, Mantei, Perlman, Strong, and Verplank, 1992, p. 5). From a futurist standpoint, HCI is important because of the possibilities of direct mind-computer interaction. To better explain, we can look at some of Kurzweil's predictions. In his book, *The Singularity is Near,* he predicts that by the 2030s things like mind uploading and complete immersion in virtual reality will be possible (Kurzweil, 2006). Like a plot from a sci-fi movie, this interaction between the brain and computers would allow humans to interface directly with computers. Kurzweil explains in his predictions that this will be made possible by nano-bots that will help control brain signals.

Interestingly, this scenario is not hard to picture, given movies such as The Matrix and Surrogates, many have seen what "plugging in" looks like. But unlike the movies, Kurzweil believes that this technology will enhance our cognitive abilities and memory capabilities.

6.2.5 What the Future Holds

Overall, the future of Artificial Intelligence is still a dividing factor for the experts of the field. With every single expert prediction about the future there are those who agree and those who disagree. These varying views have definitely influenced the media's understanding of Artificial Intelligence, simply because there are too many opinions and ideas to follow concurrently.

7. Results

7.1 Background Question Results

7.1.1 What is your age?

Table 7-2: What is your age?

What is your age?

Calculation	Result
Count	419
Sum	10149
Standard deviation	10.98
Average	24.22
Minimum	14
1st quartile (Q1)	19
Median value	20
3rd quartile (Q3)	22
Maximum	69

Null values are ignored in calculations
Q1 and Q3 calculated using minitab method

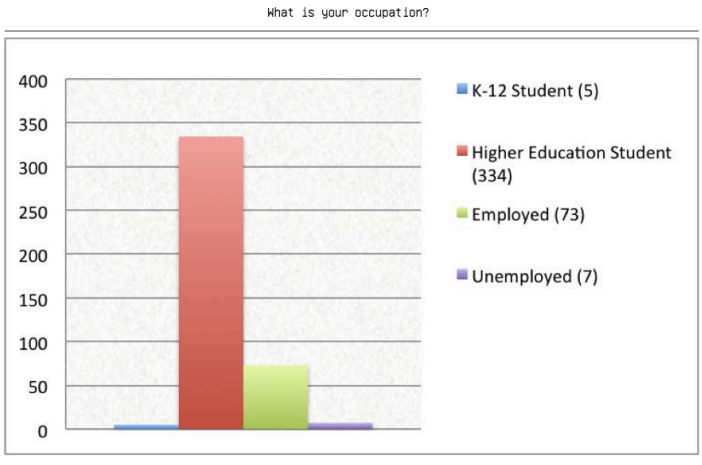
The table above (Fig 7-1) shows the age breakdown of the survey population. The average age was 24 with a minimum of 14 and a maximum of 69. Interestingly, the average age actually turned out to be much higher than we thought it would, especially because our main survey location was on a college campus. This high average age could have been caused by a large number of faculty and graduate students taking the survey.

7.1.2 What is your occupation?

Table 7-2: What is your occupation?

What is your occupation?

Answer	Count	Percentage
K-12 Student (A1)	5	1.19%
Higher Education Student (A2)	334	79.71%
Employed (A3)	73	17.42%
Unemployed (A4)	7	1.67%
No answer	0	0.00%



This histogram (Fig 7-1) shows that 80% of the survey respondents were college students.

Figure 7-1: Histogram- What is your occupation?

7.1.3 What is your gender?

Table 7-3: What is your gender

What is your gender?

Answer	Count	Percentage
Male (A1)	281	67.06%
Female (A2)	138	32.94%
No answer	0	0.00%

This background question (Table 7-3) shows that most of the survey respondents were male.

7.1.4 If applicable, what is your technical background?

Table 7-4: What is your technical background with computers?

If applicable, what is your technical background with computers?Rate your answer on a scale from 1-5, with 1 being no technical background and 5 being a strong technical background.

Answer	Count	Percentage
1 (1)	25	5.97%
2 (2)	46	10.98%
3 (3)	114	27.21%
4 (4)	123	29.36%
5 (5)	111	26.49%
No answer	0	0.00%

If applicable, what is your technical background with computers?Rate your answer on a scale from 1-5, with 1 being no technical background and 5 being a strong technical background.

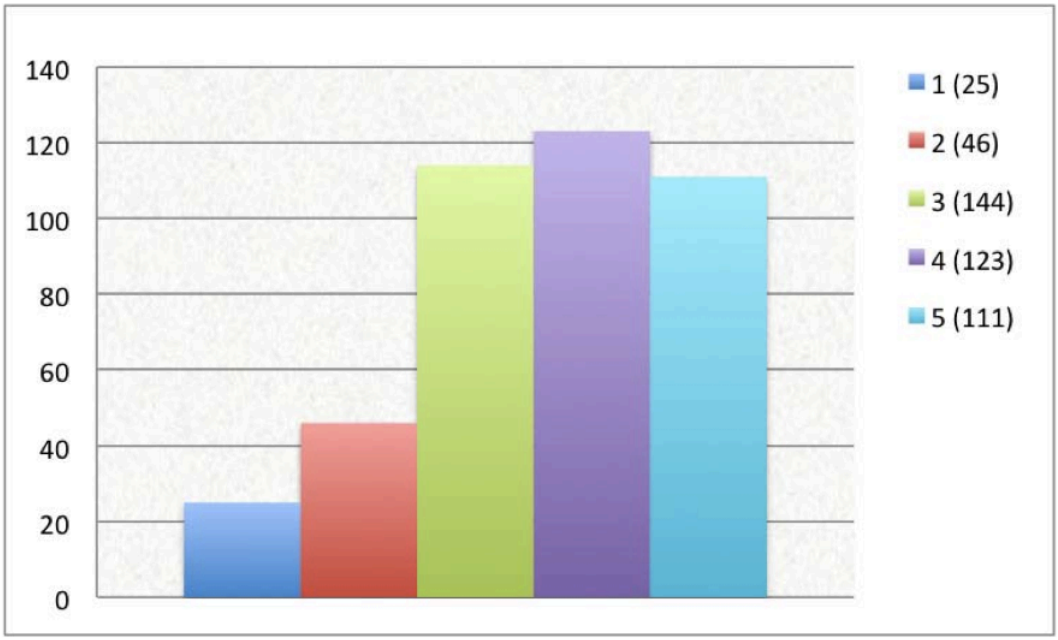


Figure 7-2: Histogram- What is your technical background with computers?

This histogram (Fig 7-2) shows that most people who took the survey had average or above average technical backgrounds. This result coincides with WPI's campus population.

7.1.5 Do you consider yourself good with computers?

Table 7-5: Do you consider yourself good with computers?

Do you consider yourself good with computers? Rate yourself on a scale from 1 to 5, with 1 strongly disagree and 5 being strongly agree.

Answer	Count	Percentage
1 (1)	11	2.63%
2 (2)	49	11.69%
3 (3)	104	24.82%
4 (4)	143	34.13%
5 (5)	112	26.73%
No answer	0	0.00%

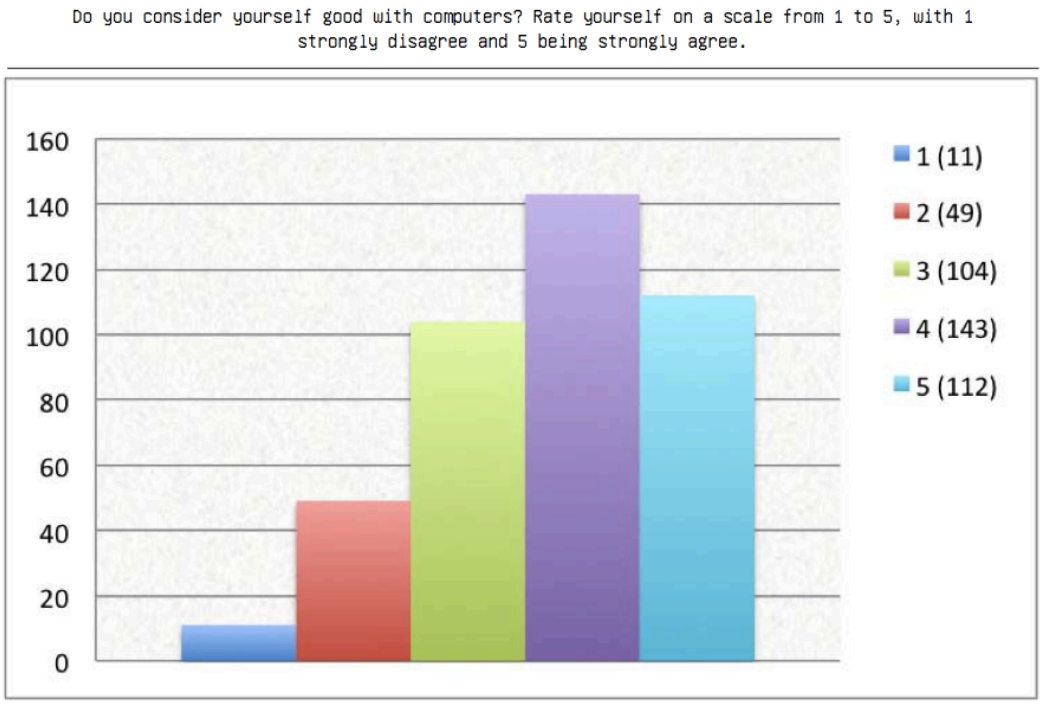


Figure 7-3: Histogram- Do you consider yourself good with computers?

This histogram (Fig 7-3) reveals that most people who took the survey considered themselves either very good or somewhat good at computers. This result also coincides with WPI's campus population.

7.1.6 Have you ever taken a class in Artificial Intelligence?

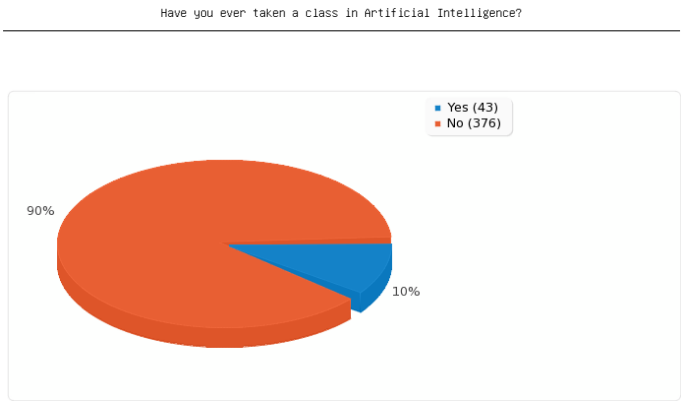


Figure 7-4: Pie Chart- Have you taken a class in AI?

This pie chart (Fig 7-4) shows that most people who took the survey had never taken a class in Artificial Intelligence.

7.1.7 Where do you get your news from?

Table 7-6: Where do you get your news from?

Where do you get your news from?

Answer	Count	Percentage
Newspaper (SQ001)	189	45.11%
TV (SQ002)	232	55.37%
Radio (SQ003)	130	31.03%
Internet (SQ004)	392	93.56%
Magazines (SQ005)	107	25.54%
Other	47	11.22%

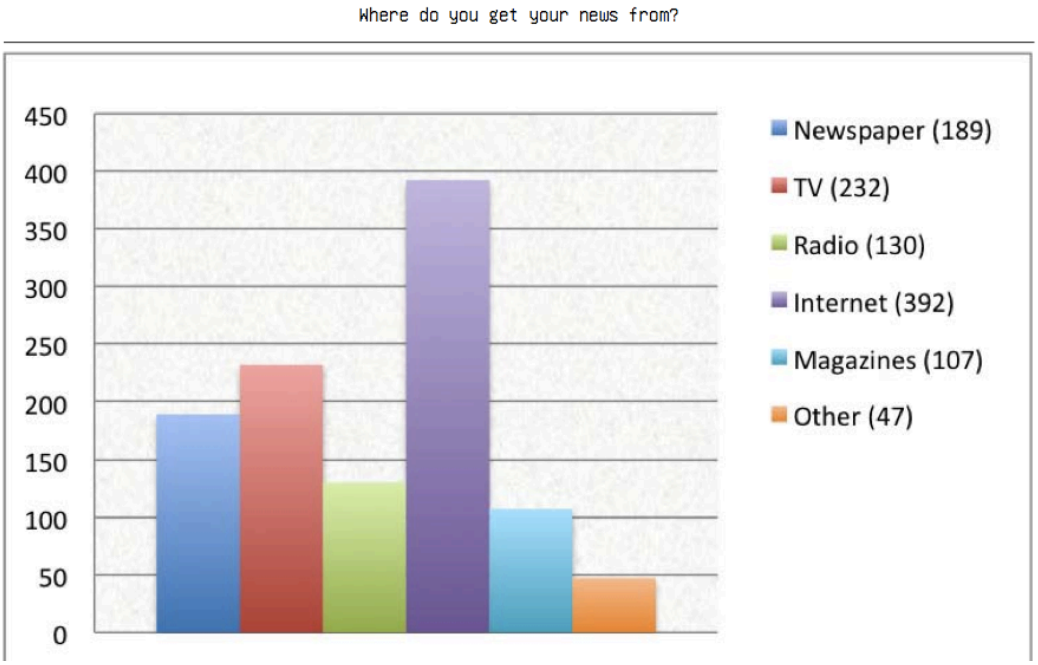


Figure 7-5: Histogram- Where do you get your news from?

This histogram (Fig 7-5) confirms our initial thought that most people get their news from the Internet. This question also reveals that overall more people seem to get their news in electronic form instead of print form (newspapers and magazines).

7.1.8 How do you think this AI related event was portrayed by the media?

Table 7-7: How was the AI event portrayed?

How do you think this event was portrayed?

Answer	Count	Percentage
Positively (A1)	182	43.44%
Negatively (A2)	24	5.73%
Neutral (A3)	213	50.84%
No answer	0	0.00%

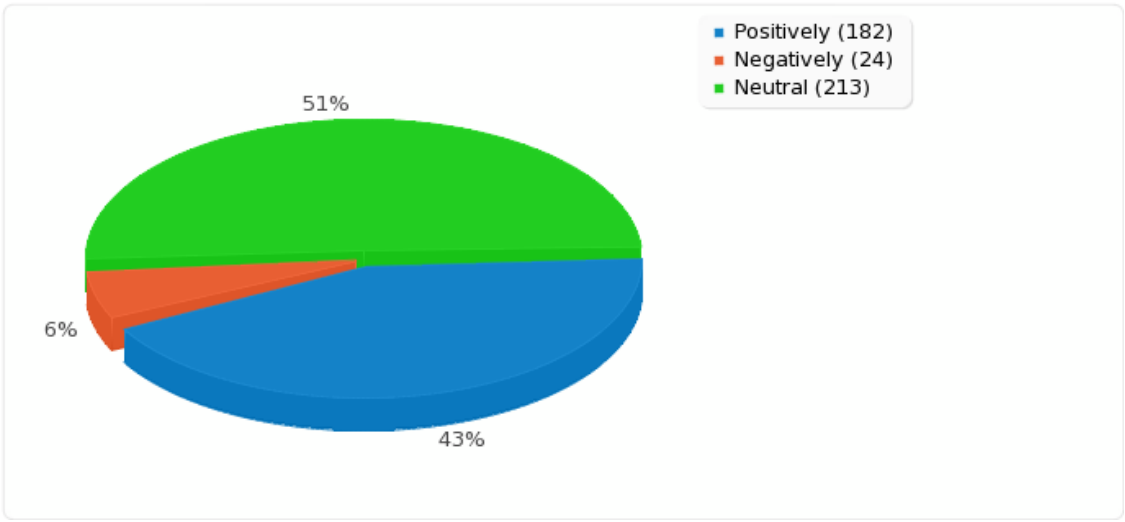


Figure 7-6: Pie Chart- How was the AI event portrayed?

This pie chart (Fig 7-6) shows that there was most people felt that the AI event they heard about in the media was portrayed either positively or neutrally. Very few had seen negative coverage of an Artificial Intelligence event.

7.1.9 Summary of Background Results

The results from our background questions confirm our initial thoughts that most of the population would be male college students with a higher technical skill and in their twenties. Surprisingly, if we compare the gender breakdown of this population (Fig 7-3) to our college campus (the main location surveyed), we had lower ratio of males to females (2 to 1 as opposed to WPI's 3 to 1).

These results also raise a few questions about the population's understanding of AI. If only 10% of the population has ever taken a class in Artificial Intelligence (Fig 7-6), then where does the rest of the population get their information about AI? Who are the people who are below the average technical background? What did they have to say about the current state of AI and its future?

7.2 Body Question Results

7.2.1 When was the last time you heard about Artificial Intelligence in the media?

Table 7-8: When was the last time you heard about AI in the media?

When was the last time you heard about Artificial Intelligence in the media (TV, newspaper, radio, internet, magazine)?

Answer	Count	Percentage
Today (A1)	26	6.21%
This week (A2)	59	14.08%
This month (A3)	127	30.31%
This year (A4)	123	29.36%
More than one year (A5)	43	10.26%
Never (A6)	41	9.79%
No answer	0	0.00%

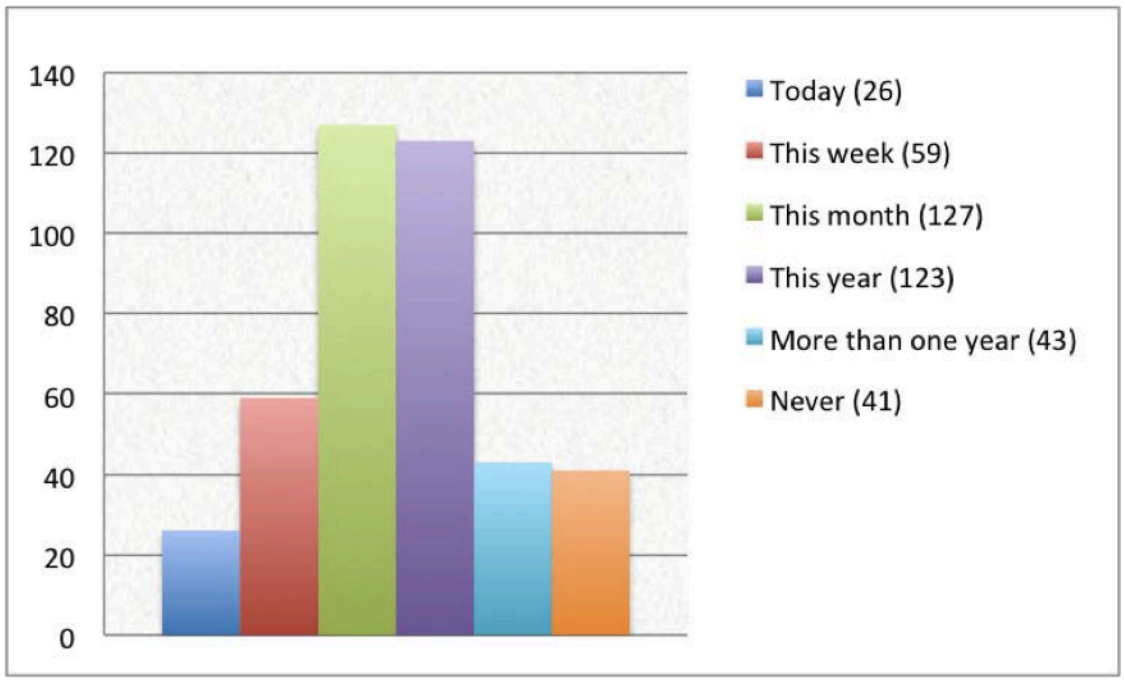


Figure 7-7: Histogram- When was the last time you heard about AI in the media?

This histogram (Fig 7-7) shows that most people had heard about AI in the media either in the past month or past year.

7.2.2 If applicable how do you think AI was portrayed in the story?

Table 7-9: How was AI portrayed in the story?

If applicable, how do you think Artificial Intelligence was portrayed in the story?Rate how you think it was portrayed on a scale from 1 to 5, with 1 very negatively and 5 being very positively.

Answer	Count	Percentage
1 (1)	12	2.86%
2 (2)	21	5.01%
3 (3)	172	41.05%
4 (4)	142	33.89%
5 (5)	72	17.18%
No answer	0	0.00%

If applicable, how do you think Artificial Intelligence was portrayed in the story?Rate how you think it was portrayed on a scale from 1 to 5, with 1 very negatively and 5 being very positively.

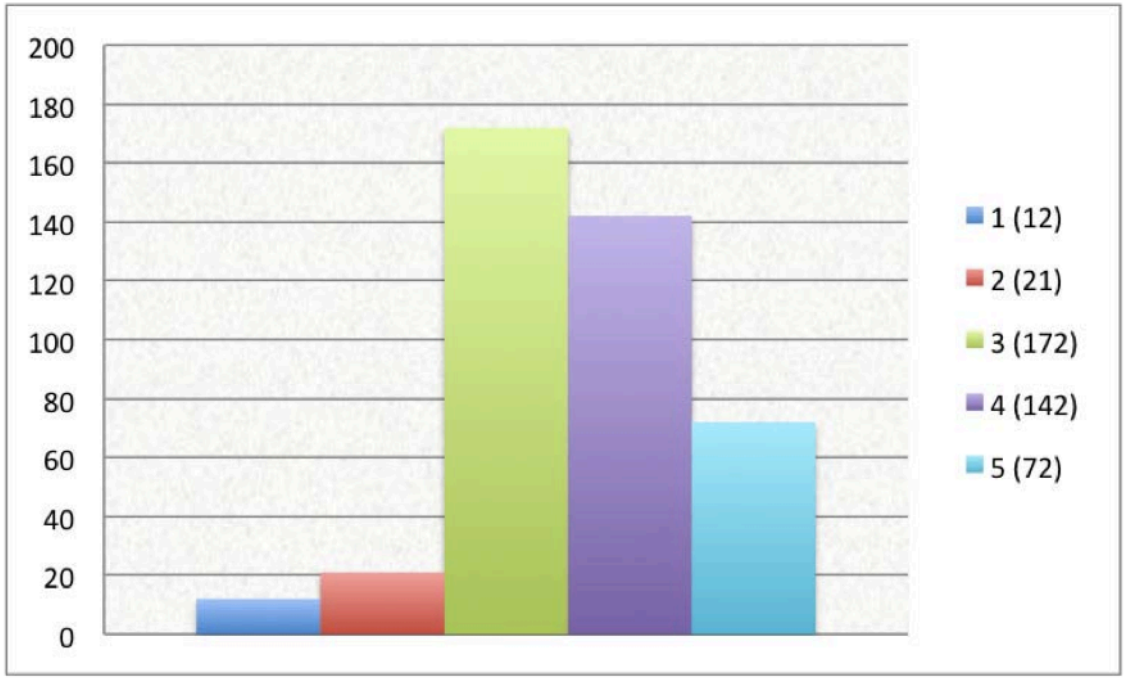


Figure 7-8: Histogram- How was AI portrayed in the story?

This histogram (Fig 7-8) shows that most people thought that the AI story they had heard in the media was either neutral or at least somewhat positive. This result also matches up with the results from our background question (Fig 7-6) about how an event in AI was portrayed.

7.2.3 Do you interact with any artificially intelligent systems regularly?

Table 7-10: Do you interact with artificially intelligent systems regularly?

Do you interact with any artificially intelligent systems regularly?For example: intelligent web applications, cell phone applications, computer software, consumer robotic products, smart appliances.

Answer	Count	Percentage
Yes (A1)	266	63.48%
No (A2)	49	11.69%
Not Sure (A3)	104	24.82%
No answer	0	0.00%

Do you interact with any artificially intelligent systems regularly?For example: intelligent web applications, cell phone applications, computer software, consumer robotic products, smart appliances.

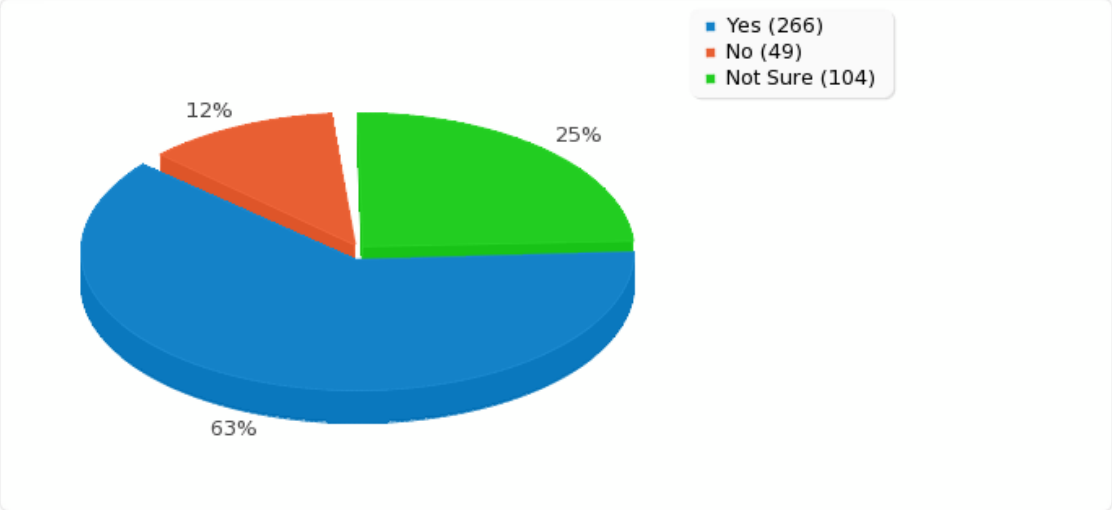


Figure 7-9: Pie Chart- Do you interact with artificially intelligent systems regularly?

This pie chart (Fig 7-9) shows that 63% of people believe that they interact with AI regularly.

7.2.4 How many artificially intelligent systems do you interact with on a daily basis?

Table 7-11: How many artificially intelligent systems do you interact with daily?

How many artificially intelligent systems do you interact with on a daily basis?This number is probably greater than one.

Answer	Count	Percentage
Less than 5 (A1)	234	55.85%
Less than 10 (A2)	120	28.64%
Less than 20 (A3)	46	10.98%
Less than 50 (A4)	12	2.86%
More than 50 (A5)	7	1.67%
No answer	0	0.00%

How many artificially intelligent systems do you interact with on a daily basis?This number is probably greater than one.

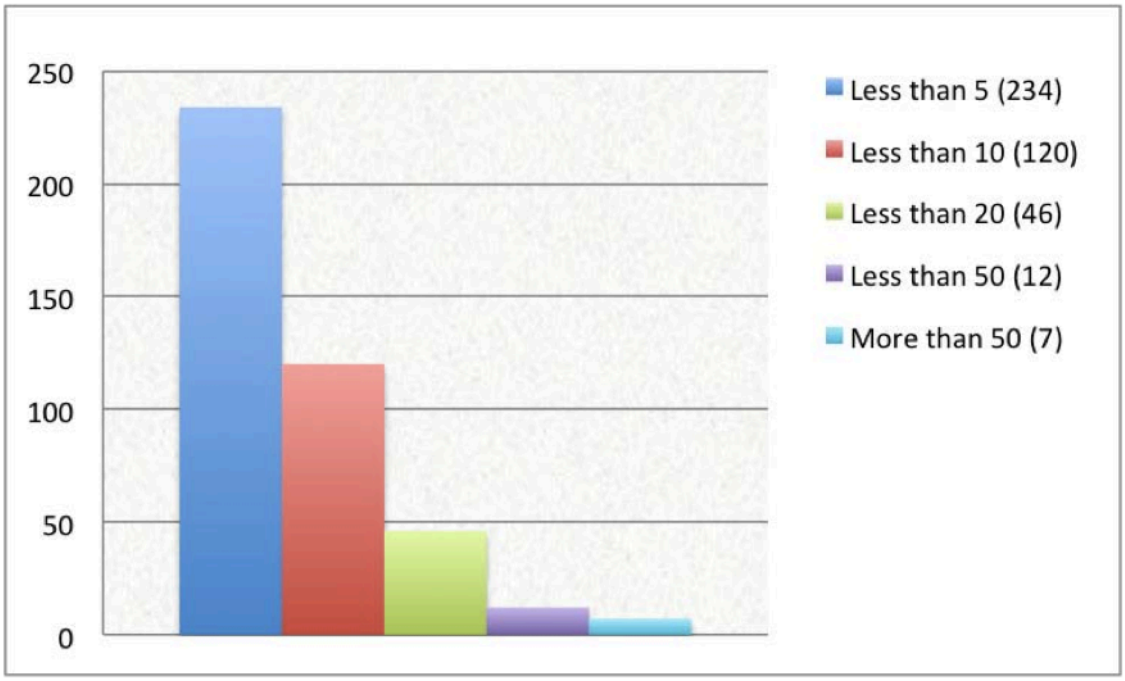


Figure 7-10: Histogram- How many artificially intelligent systems do you interact with daily?

This histogram (Fig 7-10) shows that most people believe that they interact with less than 5 artificially intelligent systems per day.

7.2.5 Is it possible for human thinking to be replicated in machines?

Table 7-12: Is it possible for human thinking to be replicated in machines?

Is it possible for human thinking to be replicated in machines?For example, a computer that could problem solve like a human.

Answer	Count	Percentage
Yes (A1)	85	20.29%
Possibly (A2)	205	48.93%
Don't Know (A3)	29	6.92%
No (A4)	100	23.87%
No answer	0	0.00%

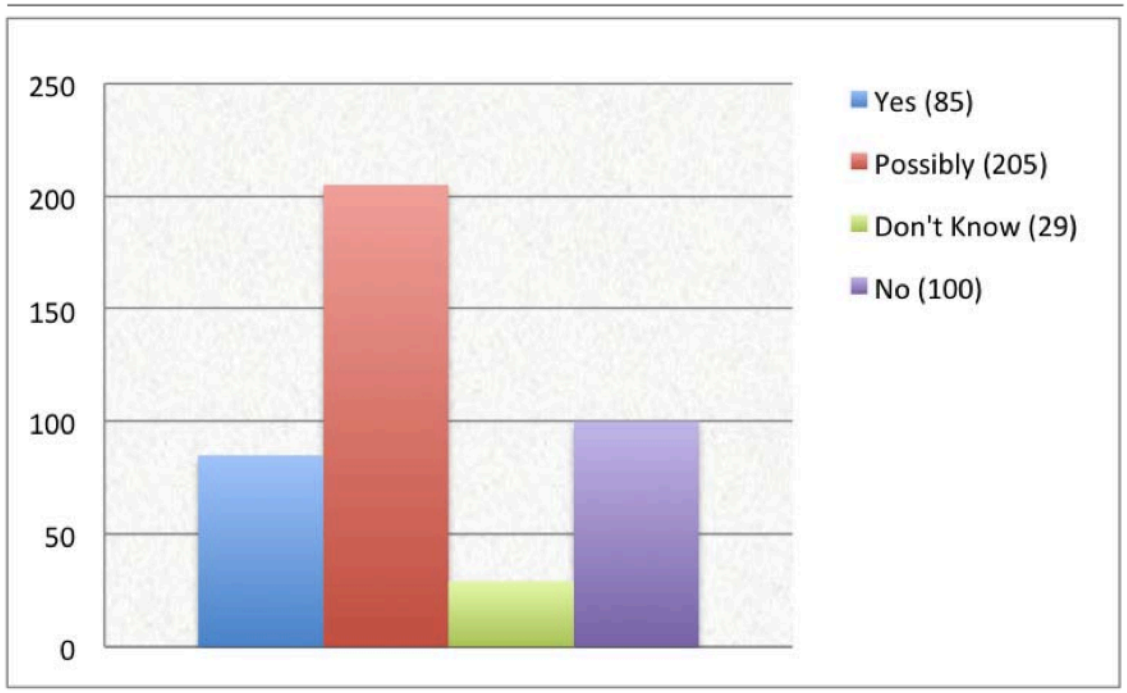


Figure 7-11: Histogram- Is it possible for human thinking to be replicated in machines?

This histogram (Fig 7-11) shows that almost 70% of people thought that it is possible for human thinking to be replicated in machines.

7.2.6 Do you believe Artificial Intelligence will replace humans in the future?

Table 7-13: Do you believe AI will replace humans in the future?

Do you believe Artificial Intelligence will replace humans in the future?An example of this could be taxi cabs which drive themselves.

Answer	Count	Percentage
Yes (A1)	81	19.33%
Possibly (A2)	145	34.61%
Not Sure (A3)	37	8.83%
No (A4)	156	37.23%
No answer	0	0.00%

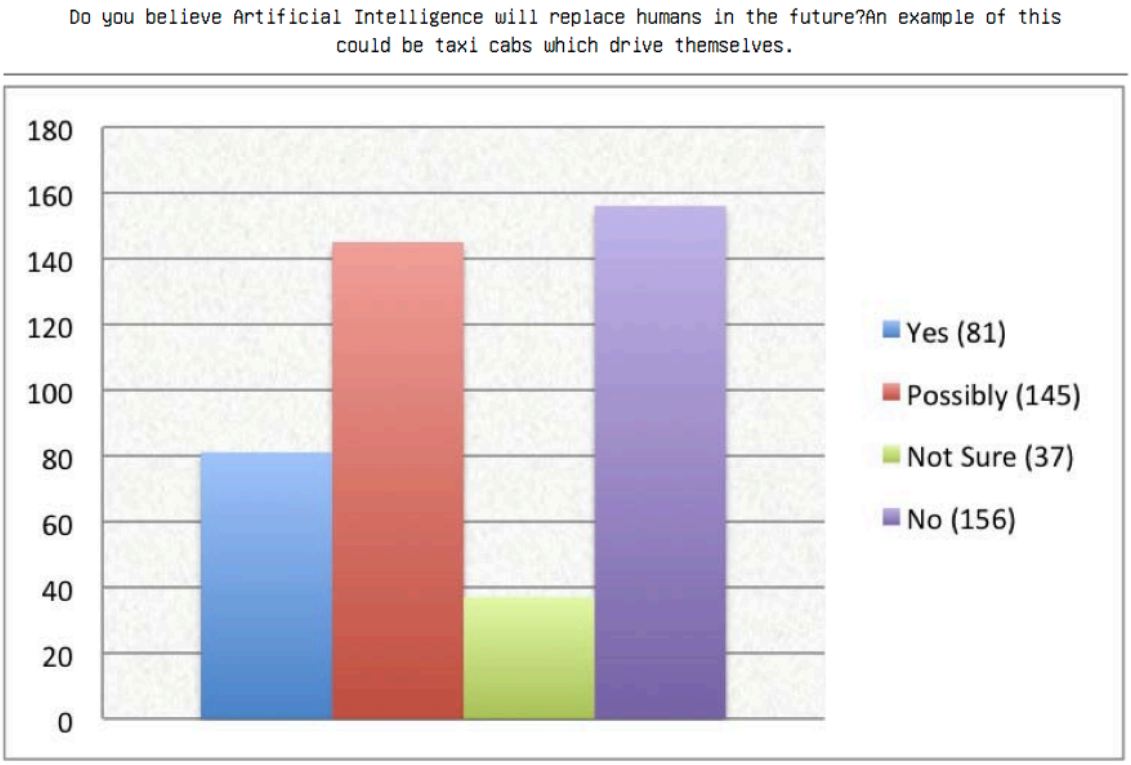


Figure 7-12: Histogram- Do you believe AI will replace humans in the future?

This histogram (Fig 7-12) shows that around 37% of people thought that humans will not be replaced by machines. In addition, around 54% of people answered either “Yes” or “Possibly” to the same question.

7.2.7 Do the promises of Artificial Intelligence scare you?

Table 7-14: Do the promises of AI scare you?

Do the promises of Artificial Intelligence scare you?

Answer	Count	Percentage
Yes (Y)	117	27.92%
No (N)	302	72.08%
No answer	0	0.00%

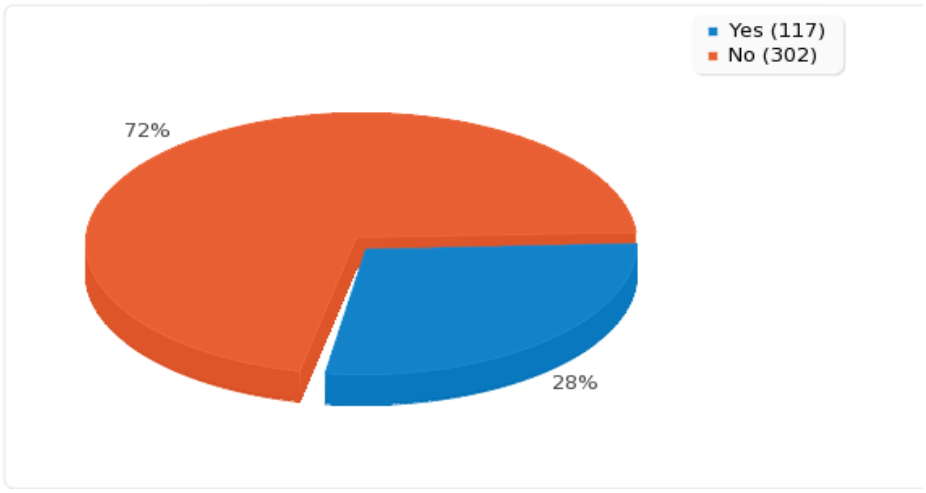


Figure 7-13: Pie Chart- Do the promises of AI scare you?

This pie chart (Fig 7-13) shows that most people are not afraid of what AI holds for the world.

7.2.8 How far are computer scientists from creating intelligent machines capable of replacing a human?

Table 7-15: How far are scientists from creating intelligent machines capable of replacing humans?

How far are computer scientists from creating intelligent machines capable of replacing a human?
[This might happen in:]

Answer	Count	Percentage
A few months (A5)	13	3.10%
A few years (A4)	72	17.18%
A few decades (A3)	216	51.55%
A few centuries (A2)	92	21.96%
A few millenniums (A1)	26	6.21%
No answer	0	0.00%

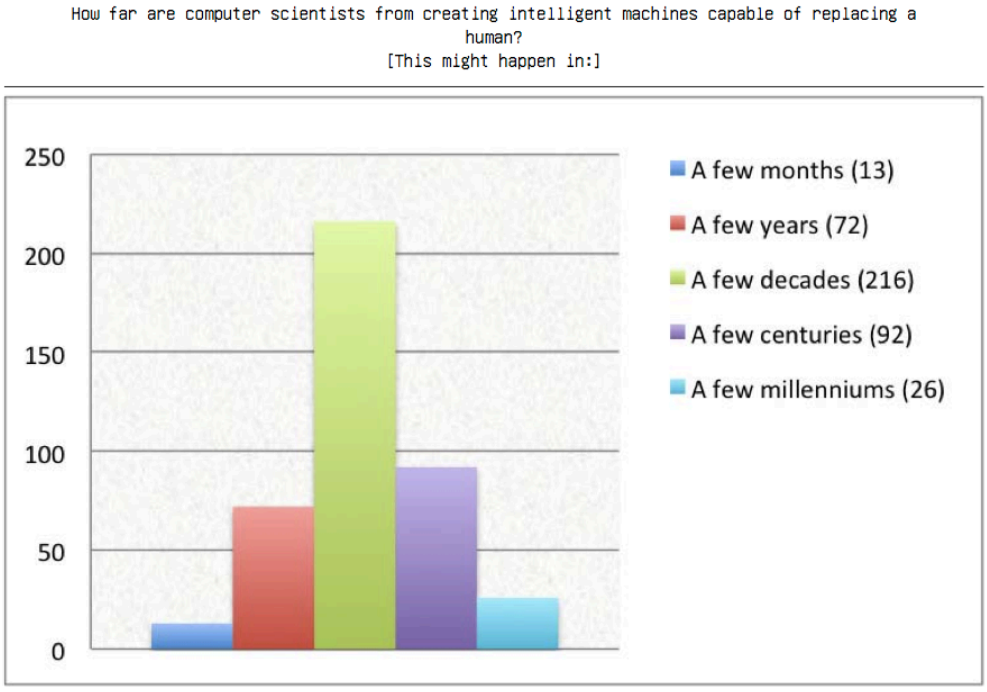


Figure 7-14: Histogram- How far are scientists from creating intelligent machines capable of replacing humans?

This histogram (Fig 7-14) shows that most people believe that computer scientist are only a few decades away from creating machines that can replace humans.

7.2.9 Will artificially intelligent systems exceed all reasoning abilities of the human brain at some point?

Table 7-16: Will AI surpass capabilities of the human brain

Will artificially intelligent systems exceed all reasoning abilities of the human brain at some point?This means computer systems which are more capable than humans at any given task.

Answer	Count	Percentage
Yes (Y)	158	37.71%
No (N)	261	62.29%
No answer	0	0.00%

Will artificially intelligent systems exceed all reasoning abilities of the human brain at some point?This means computer systems which are more capable than humans at any given task.

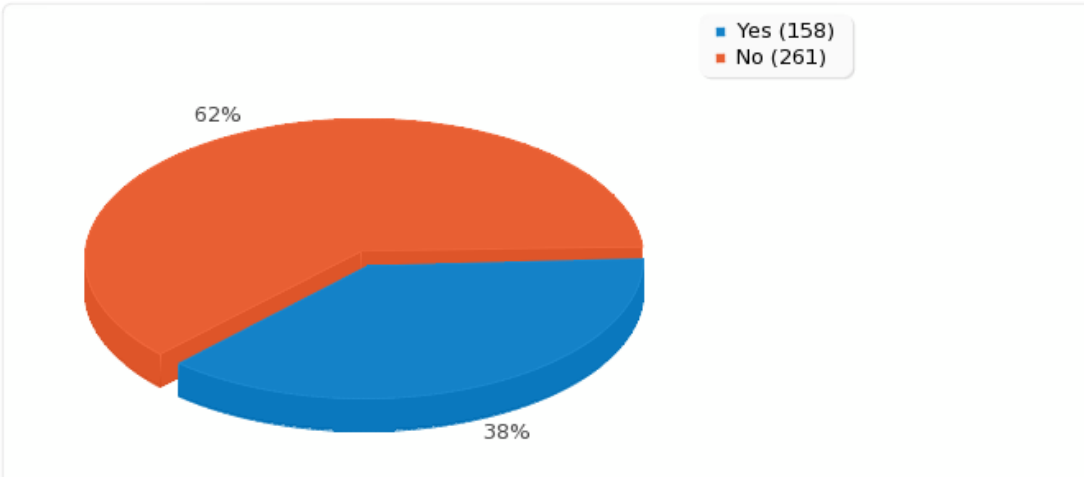


Figure 7-15: Pie Chart- Will AI surpass capabilities of the human brain?

The results from this question (Fig 7-15) show that most people don't believe that AI will surpass the human brain.

7.2.10 Summary of Body Results

The results from our body questions reveal some key facts about people's feelings towards AI. These results seem to confirm our initial thoughts that most people believe that they interact with AI regularly (Fig 7-9) and that the population is torn about AI replicating and replacing humans in the future (Figs 7-11, 7-12). Although we initially thought that the population would be torn about the replication and replacement of humans, we were a little

surprised about some of the answers to these questions. In figures 7-11 and 7-12 the amount of "no" responses to these questions surprised us. This surprised us because in both questions while there were more "possibly" responses instead of "yes" responses, there also were more "no" responses instead of "don't know responses". This seems to suggest that people thought that Artificial Intelligence is either somewhat feasible or not feasible at all.

The results have also raised a few questions for further analysis. Figure 7-7 shows that many people have heard about Artificial Intelligence in the past month or year, but does this match up with the timeframes of the media stories we have found? Is there any correlation between technical or computer skill (Figs 7-2 & 7-3) and the last time they heard about AI in the media (Fig 7-7)? Is there any correlation between technical or computer skill (Figs 7-4 & 7-5) and how many machines they interact with on a daily basis (Fig 7-10)?

7.3 Open-Ended Question Results

7.3.1 Open-ended Response Graphs

Name an example of Artificial Intelligence

The scatterplot in Figure 7-16 shows the number of responses mentioning a particular Artificial Intelligence project against age. The response frequency to that event (plotted on the x axis) and the age of the respondent (plotted on the y axis) is sorted by age, from least to greatest. The responses are from question body01-03: "Name an example of Artificial Intelligence". Figure 7-16 represents a categorization of the raw data into standard categories. In Figure 7-16, it seems that only older (29 years old and up) respondents identify spam filters. There were no other significant outliers present as most of the respondents were very young. Google had an interesting distribution that was not only high in frequency but also well distributed across both extremes of ages.

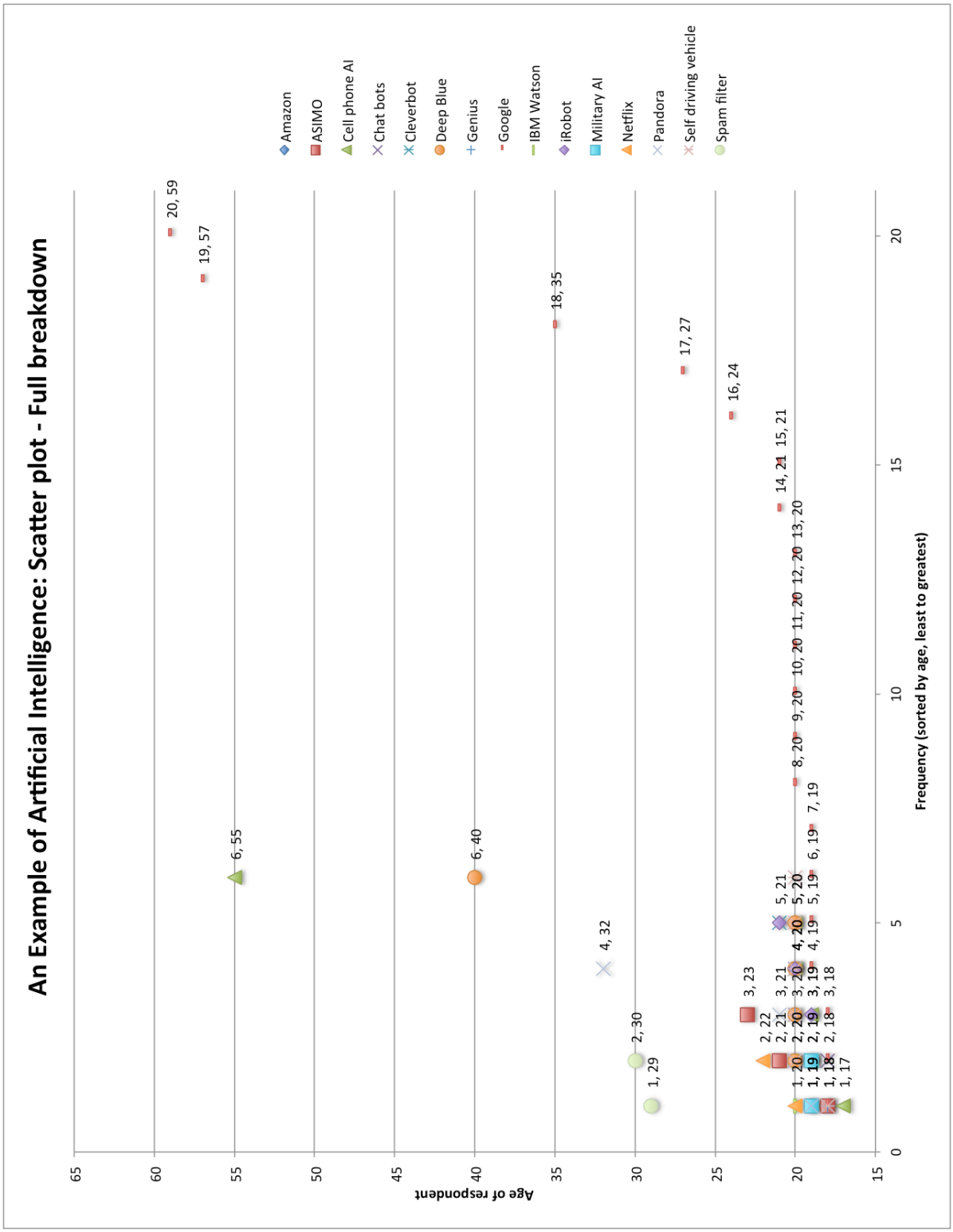


Figure 7-16: Scatter Plot- Name an example of AI

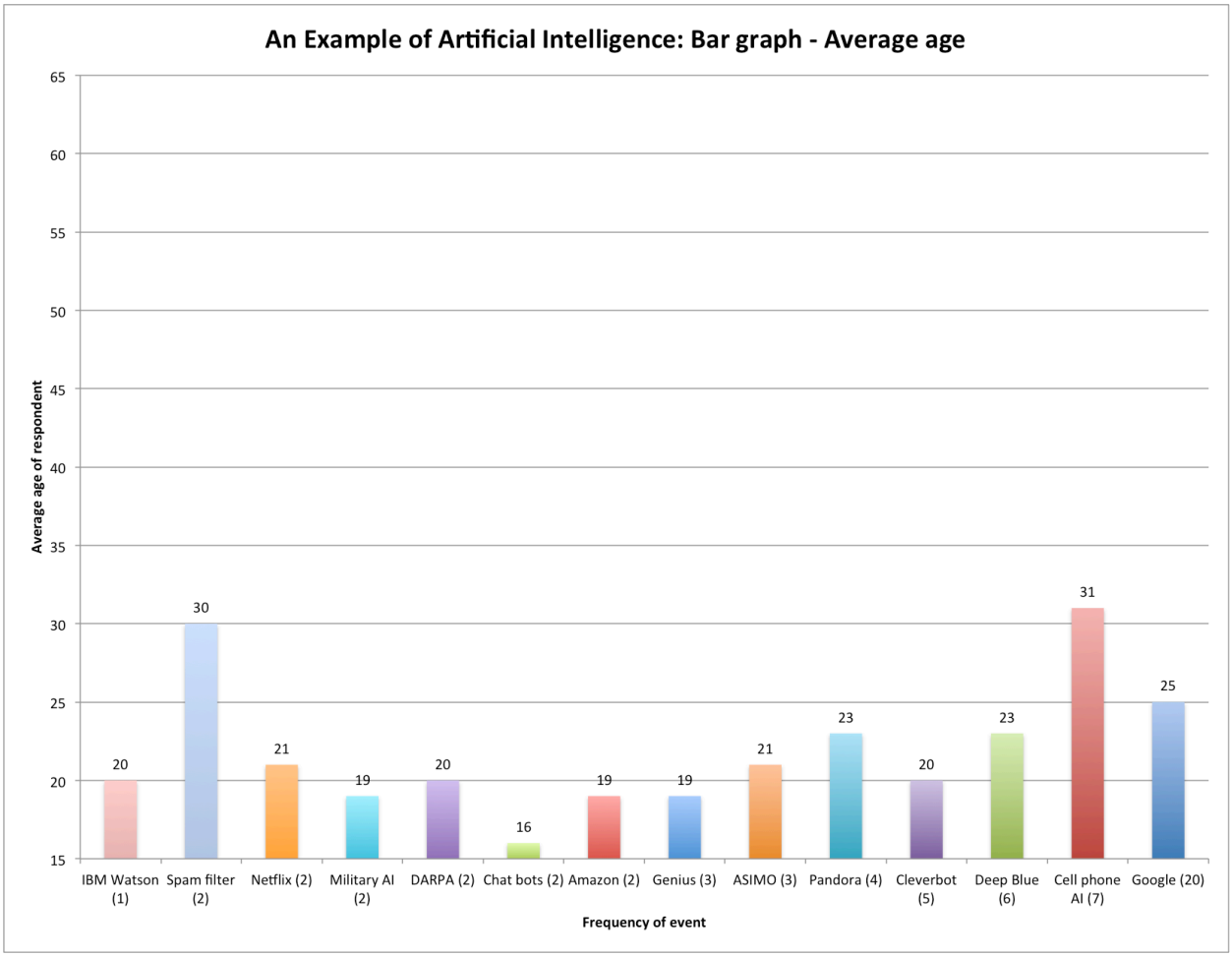


Figure 7-17: Bar Graph- Name an example of AI

The graph in Figure 7-17 shows the number of responses mentioning a particular Artificial Intelligence project against the average respondent age. The response frequency to that event is plotted on the x axis in order from least to greatest and the average age of the respondent is plotted on the y axis. The responses are from question body01-03: "Name an example of Artificial Intelligence". Figure 7-17 is based on the same data as Figure 7-16. The average respondent age answering "chatbots" was only 16—an interesting revelation that may be indicative of younger people utilizing chatbots more. Cell phone AI leads the older respondents with an average age of 31, which is not unsurprising considering the rise in market share within the United States recently.

Name a recent event about Artificial Intelligence that had the most impact on you

The scatterplot in Figure 7-18 shows the number of responses mentioning a particular Artificial Intelligence project against age. The response frequency to that event (plotted on the x axis) and the age of the respondent (plotted on the y axis) is sorted by age, from least to greatest. The responses are from question background08: "Name a recent event about Artificial Intelligence that had the most impact on you". Figure 7-18 represents a categorization of the raw data into standard categories. In Figure 7-18, it seems that only older (29 years old and up) respondents identify Healthcare AI, Pandora and Facebook. It is interesting that no younger (29 years old and below) respondents cited any of the three examples—but particularly Facebook and Pandora. One would think that Facebook and Pandora would be popular with younger respondents. Google dominated by the number of responses but contrasted with Figure 7-16, was a less diverse distribution (only a few older respondents).

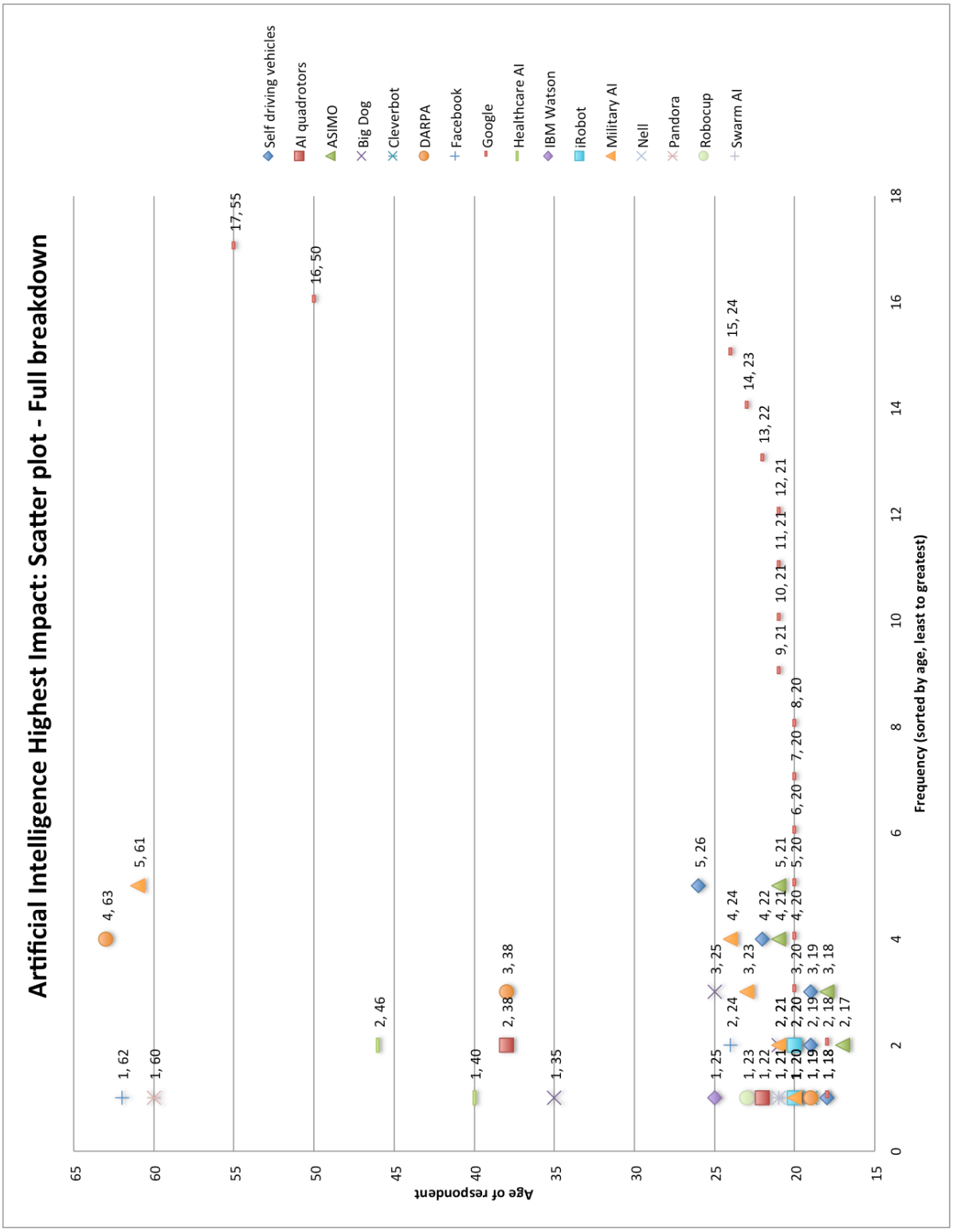


Figure 7-18: Scatter Plot- Name a recent event about AI that had the most impact on you

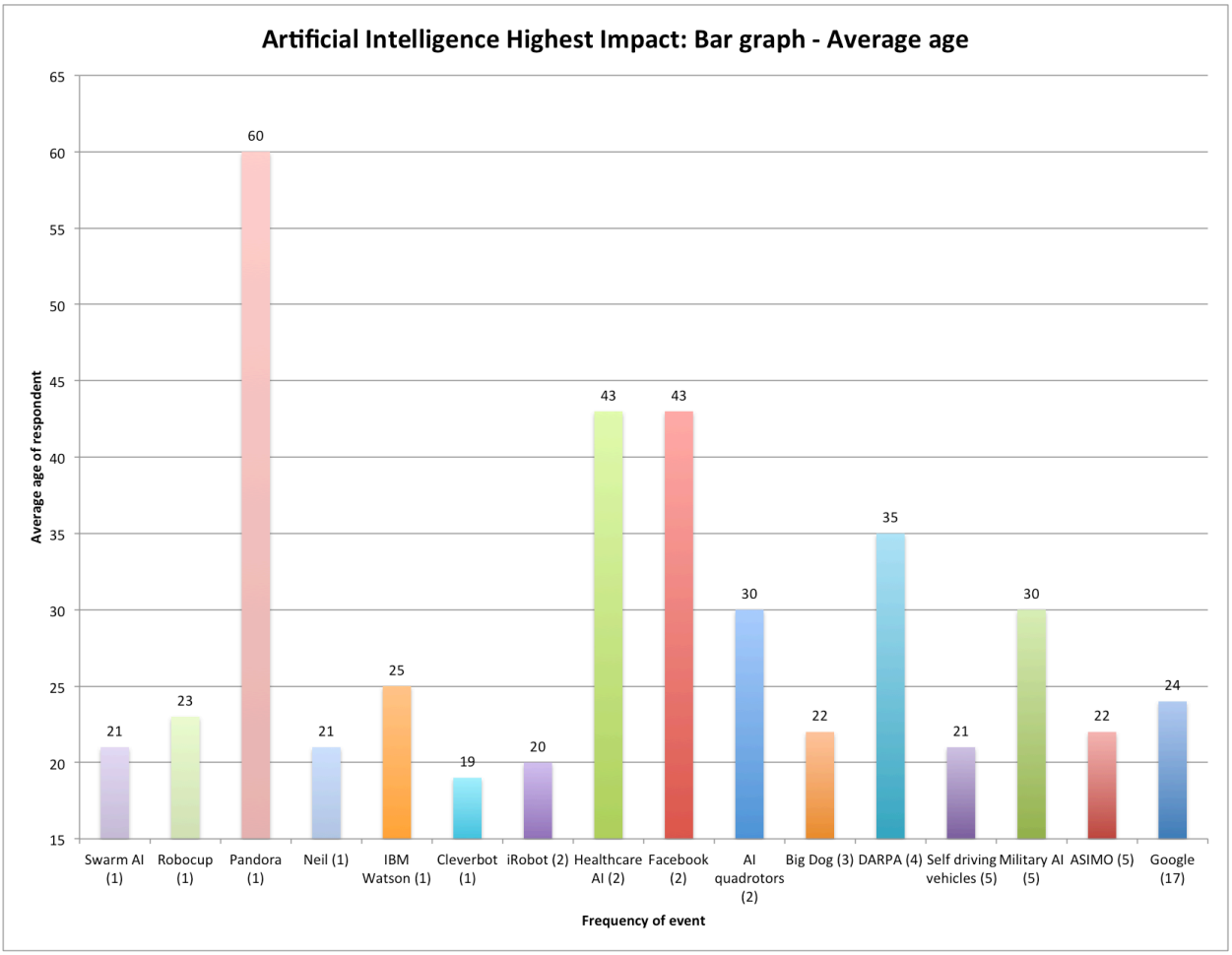


Figure 7-19: Bar Graph- Name a recent event about AI that had the most impact on you

The graph in Figure 7-19 shows the number of responses mentioning a particular Artificial Intelligence project against the average respondent age. The response frequency to that event is plotted on the x axis in order from least to greatest and the average age of the respondent is plotted on the y axis. The responses are from question background08: "Name a recent event about Artificial Intelligence that had the most impact on you". Figure 7-19 is based on the same data as Figure 7-18. Figure 7-19 shows an interesting number of outliers for the older respondents. Pandora, AI quadrotors, Healthcare AI, DARPA and Military AI dominated the older respondents (29 years old and above). Overall this Figure 7-19 showed more variation than Figure 7-17, which was relatively flat.

7.3.2 Word Maps

Name a recent event about Artificial Intelligence that had the most impact on you

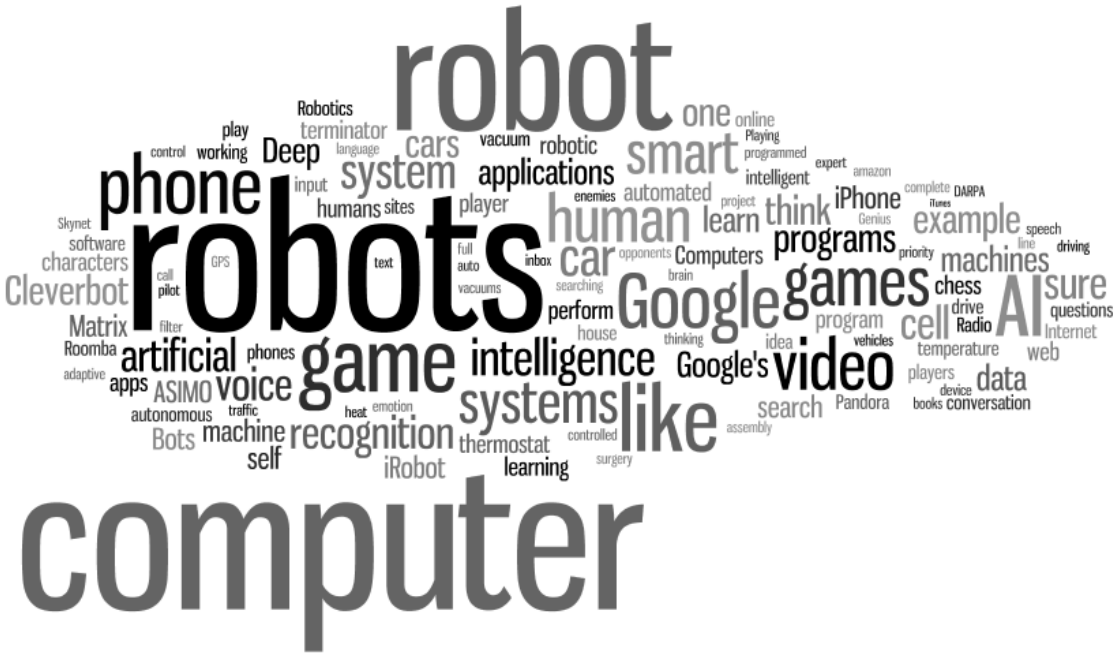


Figure 7-20: Word Map– Name a recent event about AI that had the most impact on you

The word map in Figure 7-20 shows the raw responses from question background08: "Name a recent event about Artificial Intelligence that had the most impact on you". While standardization of the open ended responses were needed to produce Figures 7-16 – 7-19, these word maps show the raw form inputted by the respondents for this question. These word maps were used to help identify trends to look for in the data, after removing ambiguous and low content words ("the", "like", "I", "etcetera"). "Robot" and "robots" seem to be very popular, as is "computer", "game", "Google" and "phone".

Name an example of Artificial Intelligence

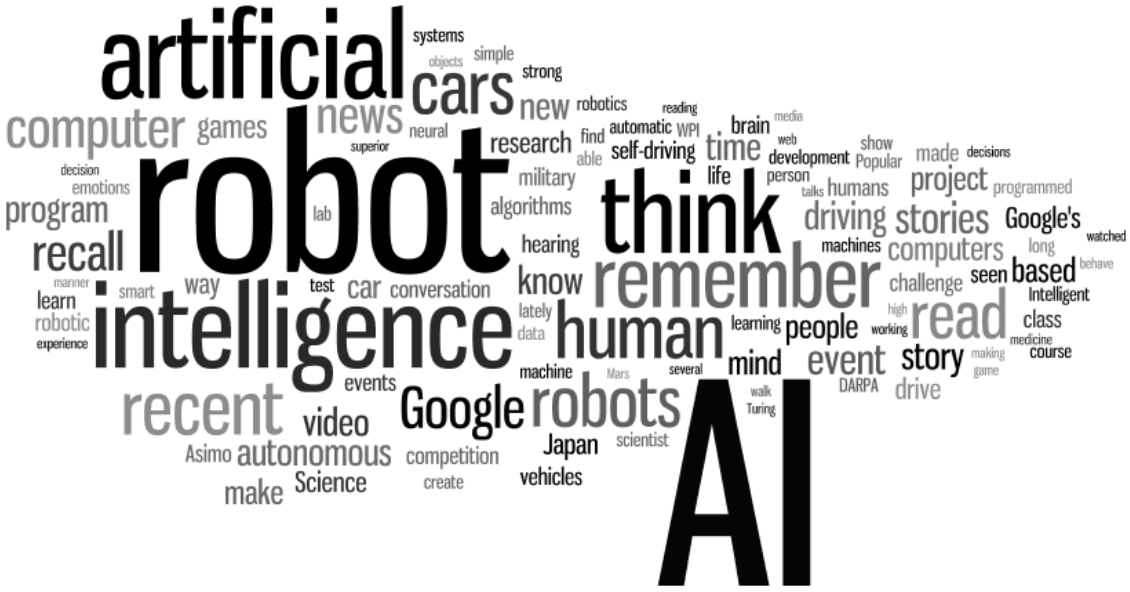


Figure 7-21: Word Map- Name an example of AI

The word map in Figure 7-21 shows the raw responses from question body01-03: "Name an example of Artificial Intelligence". While standardization of the open ended responses were needed to produce Figures 7-16 – 7-19, these word maps show the raw form inputted by the respondents. These word maps were used to help identify trends to look for in the data, after removing ambiguous and low content words ("the", "like", "I", "etcetera"). "Robot", "AI" and "intelligence" seem to be very popular, as is "think", "Google", "cars" and "human".

7.4 Results From Question Analysis

The following section shows the results from our analysis of the survey results. In the cross tabulation tables below (Tables 7-17–7-21), the *Pearson Chi-Square* value is used to determine the significance of the cross tabulation comparison. This section only contains the results that were significant. Significance for these results means that the results were statistically significant (greater than 95% probability) and not just caused by pure chance.

7.4.1 Gender vs Do the promises of Artificial Intelligence scare you?

Table 7-17 : Crosstab & Chi-Square: Gender vs Promises of AI

		Do the promises of Artificial Intelligence scare you?		
		Yes	No	Total
What_is_your_gender?	Male	58	223	281
	Female	59	79	138
Total		117	302	419

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	22.486[a]	1	.000		
Continuity Correction[b]	21.400	1	.000		
Likelihood Ratio	21.744	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	22.432	1	.000		
N of Valid Cases	419				

In this cross tabulation (Table 7-17), we wanted to see if there was any difference between genders and a fear of Artificial Intelligence. This comparison proved to have some significant result and demonstrated that percentagewise, more women than men were afraid of the promises of Artificial Intelligence.

7.4.2 Age vs Where do you get your news from? [Newspaper]

Table 7-18 : Crosstab & Chi-Square: Age vs Where do you get your news from [Newspaper]

		Where do you get your news from? [Newspaper]	
		No	Yes	Total
Age split	0-35	218	155	373
	36-	12	34	46
Total		230	189	419

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	17.316[a]	1	.000		
Continuity Correction[b]	16.034	1	.000		
Likelihood Ratio	17.638	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	17.275	1	.000		
N of Valid Cases	419				

The results above show the results for the cross tabulation (Table 7-18) between the two age groups and whether or not they get their news from a newspaper. This comparison showed that based on percentage, more people above 35 get their news from the newspaper.

7.4.3 Age vs Where do you get your news from? [Radio]

Table 7-19 : Crosstab & Chi-Square: Age vs Where do you get your news from [Radio]

		Where do you get your news from? [Radio]	
		No	Yes	Total
Age split	0-35	275	98	373
	36-	14	32	46
Total		289	130	419

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	35.863[a]	1	.000		
Continuity Correction[b]	33.869	1	.000		
Likelihood Ratio	32.828	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	35.778	1	.000		
N of Valid Cases	419				

The results above show the results for the cross tabulation (Table 7-19) between the two age groups and whether or not they get their news from the radio. This comparison showed that based on percentage, more people above 35 get their news from the radio.

7.4.4 Age vs Where do you get your news from? [Internet]

Table 7-20 : Crosstab & Chi-Square: Age vs Where do you get your news from [Internet]

		Where do you get your news from? [Internet]	
		No	Yes	Total
Age split	0-35	19	354	373
	36-	8	38	46
Total		27	392	419

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	10.272[a]	1	.001		
Continuity Correction[b]	8.334	1	.004		
Likelihood Ratio	7.637	1	.006		
Fisher's Exact Test				.005	.005
Linear-by-Linear Association	10.248	1	.001		
N of Valid Cases	419				

The results above show the results for the cross tabulation (Table 7-20) between the two age groups and whether or not they get their news from the Internet. This comparison showed that in both age groups, a majority of the people gets their news from the Internet.

7.4.5 Age vs Where do you get your news from? [Magazines]

Table 7-21 : Crosstab & Chi-Square: Age vs Where do you get your news from [Magazines]

		Where do you get your news from? [Magazines]		
		No	Yes	Total
Age split	0-35	293	80	373
	36-	19	27	46
Total		312	107	419

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	29.878[a]	1	.000		
Continuity Correction[b]	27.951	1	.000		
Likelihood Ratio	25.953	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	29.806	1	.000		
N of Valid Cases	419				

The results above show the results for the cross tabulation (Table 7-21) between the two age groups and whether or not they get their news from magazines. This comparison showed that based on percent, more people above 35 get their news from magazines.

7.4.6 Technical Background vs When was the last time you heard about Artificial Intelligence in the media?

Table 7-22: Uni-variate Analysis & Mean- Technical background vs The last time you heard about AI in the media

If applicable what is your technical background with computers? Rate your answer on a scale from 1-5, with 1 being no technical background and 5 being a strong technical background.	Mean	Std. Deviation	N
1 – None	2.80	1.384	25
2 – Little to none	2.89	1.386	46
3 – Average	2.89	1.349	114
4 – Proficient	2.40	1.220	123
5 – Expert	2.09	1.149	111
Total	2.53	1.304	419

		95% Confidence Interval	
Mean	Std. Error	Lower Bound	Upper Bound
2.613	.075	2.466	2.761

This uni-variate comparison shows that people with a higher technical background have seen Artificial Intelligence in the news more recently. In the descriptive statistics table (Table 7-22), the mean value coincides with the scale table (Table 7-23). For example, the mean for people with a technical background of 5 (strong) was 2.09, meaning that the average response was "this month" (2). On the other hand, people with technical backgrounds of 2 and 3 had averages of 2.89, which lies closer to "this year" (3).

Table 7-23: Scale –When was the last time you heard about AI in the media?

When was the last time you heard about AI in the media? **Scale**	
0	Today
1	This Week
2	This Month
3	This year
4	More than a year
5	Never

7.4.7 Technical Background vs Is it possible for human thinking to be replicated in machines?

Table 7-24: Uni-variate Analysis & Mean- Technical background vs Human thinking replicated in machines

If applicable what is your technical background with computers? Rate your answer on a scale from 1-5, with 1 being no technical background and 5 being a strong technical background.	Mean	Std. Deviation	N
1 – None	1.48	1.122	25
2 – Little to none	1.39	1.043	46
3 – Average	1.51	1.033	114
4 – Proficient	1.38	1.028	123
5 – Expert	1.08	1.063	111
Total	1.34	1.054	419

		95% Confidence Interval	
Mean	Std. Error	Lower Bound	Upper Bound
1.369	.062	1.247	1.490

Table 7-25: Scale – Is it possible for human thinking to be replicated in machines?

Is it possible for human thinking to be replicated in machines? **Scale**	
0	Yes
1	Possibly
2	Don't Know
3	No

This uni-variate comparison shows that people with a higher technical background, particularly those with a strong background(5), believe that it is possible for human thinking to be replicated in machines. The means in the descriptive statistics table (Table 7-24) coincide with the values in the scale table (Table 7-25). These means demonstrate that groups of people with technical backgrounds less than 5 were more in between choices. The means for these groups varied between 1.38 and 1.51 meaning that overall, the group was divided between "possibly" (1) and "don't know"(2).

7.4.8 Technical Background vs How many artificially intelligent machines do you interact with on a daily basis?

Table 7-26: Uni-variate Analysis & Mean- Technical background vs # of artificially intelligent machines interacted with

If applicable what is your technical background with computers? Rate your answer on a scale from 1-5, with 1 being no technical background and 5 being a strong technical background.	Mean	Std. Deviation	N
1 – None	.20	.577	25
2 – Little to none	.65	.994	46
3 – Average	.39	.660	114
4 – Proficient	.73	.906	123
5 – Expert	.95	1.030	111
Total	.66	.905	419

		95% Confidence Interval	
Mean	Std. Error	Lower Bound	Upper Bound
.587	.052	.485	.689

Table 7-27: Scale – How many artificially intelligent machines do you interact with on a daily basis?

How many artificially intelligent machines do you interact with on a daily basis? **Scale**	
0	Less than 5
1	Less than 10
2	Less than 20
3	Less than 50
4	More than 50

This uni-variate comparison, demonstrated to us that people with a higher technical background believed that they interacted with on average, more artificially intelligent machines then people with a lower technical background. In the descriptive statistics table above (Table 7-26), each mean is based off of the numbers in the scale table (Table 7-27). In other words, people with a technical background of 5 (Strong), had an average response of .95, the highest out of the entire category. This number, .95, means that the average answer was very close to 1, which coincides with a response of Less than 10. In contrast, the average response for people with a technical skill of 1, was .20, meaning that the average response was between Less than 5 (0) and Less than 10 (1), but because the number is less than .5, there must have been more responses for the lower bound in this case 0 (less than 5).

7.4.9 Computer Skill (Good with computers) vs When was the last time you heard about Artificial Intelligence in the media?

Table 7-28: Uni-variate Analysis & Mean- Computer Skills vs The last time you heard about AI in the media

Do you consider yourself good with computers? Rate yourself on a scale from 1 to 5, with 1 strongly disagree and 5 being strongly agree.	Mean	Std. Deviation	N
1 – Strongly Disagree	3.18	1.662	11
2 – Disagree	2.55	1.370	49
3 – Neutral	3.12	1.317	104
4 – Agree	2.35	1.188	143
5 – Strongly Agree	2.13	1.166	112
Total	2.53	1.304	419

		95% Confidence Interval	
Mean	Std. Error	Lower Bound	Upper Bound
2.666	.093	2.484	2.848

Table 7-29: Scale –When was the last time you heard about AI in the media?

When was the last time you heard about AI in the media? **Scale**	
0	Today
1	This Week
2	This Month
3	This year
4	More than a year
5	Never

This uni-variate comparison shows that people who considered themselves better with computers have seen Artificial Intelligence in the news more recently. In the descriptive statistics table (Table 7-28), the mean value coincides with the scale table (Table 7-29). For example, the mean for people considered themselves very good with computers (5) was 2.13 meaning that the average response was "this month" (2). On the other hand, people who didn't consider themselves good with computers had an average response of 3.18, which means that the average response was "this year"(3). Here it is also important to note that a mean of 3.18 means that there also had to some responses above 3, which in this case means that the last time some people saw AI in the media was either "more than a year" (4) or "never" (5).

7.4.10 Computer Skill (Good with computers) vs Is it possible for human thinking to be replicated in machines?

Table 7-30: Uni-variate Analysis & Mean- Computer skill vs Human thinking replicated in machines

Do you consider yourself good with computers? Rate yourself on a scale from 1 to 5, with 1 strongly disagree and 5 being strongly agree.	Mean	Std. Deviation	N
1 – Strongly Disagree	1.36	1.206	11
2 – Disagree	1.35	.969	49
3 – Neutral	1.50	1.024	104
4 – Agree	1.41	1.077	143
5 – Strongly Agree	1.11	1.051	112
Total	1.34	1.054	419

		95% Confidence Interval	
Mean	Std. Error	Lower Bound	Upper Bound
1.346	.078	1.194	1.499

Table 7-31: Scale – Is it possible for human thinking to be replicated in machines?

Is it possible for human thinking to be replicated in machines? **Scale**	
0	Yes
1	Possibly
2	Don't Know
3	No

This uni-variate comparison shows that people who considered themselves better with computers, believe that it is possible for human thinking to be replicated in machines. The means in the descriptive statistics table (Table 7-30) coincide with the scale table (Table 7-31) and demonstrate that groups of people who didn't strongly agree with the statement were more in between choices. The means for these groups varied between 1.35 and 1.50 meaning that overall, the group was pretty divided between "possibly" (1) and "don't know". On the other hand, people who strongly agreed (5), had the lowest mean of 1.11 meaning that most answered that it is possible for human thinking to be replicated in machines.

7.4.11 Computer Skill (Good with computers) vs How many artificially intelligent machines do you interact with on a daily basis?

Table 7-32: Uni-variate Analysis & Mean- Computer skill vs # of artificially intelligent machines interacted with

Do you consider yourself good with computers? Rate yourself on a scale from 1 to 5, with 1 strongly disagree and 5 being strongly agree.	Mean	Std. Deviation	N
1 – Strongly Disagree	.18	.603	11
2 – Disagree	.41	.788	49
3 – Neutral	.47	.800	104
4 – Agree	.69	.858	143
5 – Strongly Agree	.95	1.038	112
Total	.66	.905	419

		95% Confidence Interval	
Mean	Std. Error	Lower Bound	Upper Bound
.540	.065	.411	.669

Table 7-33: Scale – How many artificially intelligent machines do you interact with on a daily basis?

How many artificially intelligent machines do you interact with on a daily basis? **Scale**	
0	Less than 5
1	Less than 10
2	Less than 20
3	Less than 50
4	More than 50

This uni-variate comparison shows that people who considered themselves better with computers believed that they interacted with on average, more artificially intelligent machines then people with a lower technical background. In the descriptive statistics table (Table 7-32) the mean values coincide with the scale table (Table 7-33) and demonstrate that people with a technical background of 5 (Strong), had an average response of .95, the highest out of the entire category. This number, .95, means that the average answer was very close to 1, which coincides with a response of "less than 10". In contrast, the average response for people with a technical skill of 1, was .18, meaning that the average response was between "less than 5" (0) and "less than 10" (1), but because the number is less than .5, there must have been more responses for the lower bound in this case 0 or "less than 5".

7.4.12 Have you ever take a class in Artificial Intelligence vs Is it possible for human thinking to be replicated in machines?

Table 7-34: Uni-variate Analysis - Taken a class in AI vs Human thinking replicated in machines

Have you ever taken a class in Artificial Intelligence?	Mean	Std. Deviation	N
No	1.41	1.057	376
Yes	.79	.861	43
Total	1.34	1.054	419

	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	14.652[a]	1	14.652	13.582	.000
Intercept	186.356	1	186.356	172.745	.000
Have you ever taken a class in Artificial Intelligence?	14.652	1	14.652	13.582	.000
Error	449.858	417	1.079		
Total	1221.000	419			
Corrected Total	464.511	418			

Table 7-35: Scale – Is it possible for human thinking to be replicated in machines?

Is it possible for human thinking to be replicated in machines? **Scale**	
0	Yes
1	Possibly
2	Don't Know
3	No

This uni-variate comparison shows that people who have taken a class in Artificial Intelligence believe that it is possible for human thinking to be replicated in machines. The means in the descriptive statistics table (Table 7-34) coincide with the values in the scale table (Table 7-35) and demonstrate that the group of people who had never taken a class in Artificial Intelligence were divided between "Possibly" (1) and "don't know" (2). On the other hand, people who had taken a class in Artificial Intelligence (5), had a lower mean of .79 meaning that most answered that it is possible for human thinking to be replicated in machines.

8. Conclusions

8.1. Key Results

As stated in section 3, our goal was to analyze the extent to which public and expert opinion mirrors the reality of the Artificial Intelligence field. We determined that this goal would be reached by studying two core relations, the relationships between the experts and the media; and between the media and the public. Based on our research and our survey data, we have reached the following conclusions about these two relationships:

- There is a lack of expert presence in the media.
- The media does affect the public's view of Artificial Intelligence.

Based on these two conclusions, we have reached the following conclusion about our main goal, the extent to which public and expert opinion mirrors the reality of the Artificial Intelligence field:

- There is no connection between the experts' work in Artificial Intelligence and the public's understanding of the experts' research in Artificial Intelligence.

8.1.1 Media vs. Experts

The relationship between media and Artificial intelligence experts has been overall very cordial. The reporting is rarely critical of the possibilities of Artificial Intelligence and rarely questions the moral and ethical foundations of the research involved. However, there have been marked differences in reporting over the years. While overall the coverage of Artificial Intelligence has been largely for purposes of popular entertainment, if we compare the attitudes towards experts in the past with the present there is a difference. In the past, experts seem to have been more involved in reporting the vision of Artificial Intelligence. It is not difficult to find Marvin Minsky or John McCarthy commenting on the future of Artificial Intelligence in the 1960s and 1970s. However, recent commenting involved fewer visionaries.

This new reporting can be explained in a variety of ways. The first may be the lack of an overarching vision in the field. Artificial Intelligence has advanced as a science within multiple subfields and applications. This splintering makes visionaries and unifying figures more difficult

to appear. Another reason also arrives from this increased complexity and scientific advancement. As discovery accelerates, more information is available which forces scholars to concentrate on their studies more in order to keep up with the fast-paced nature of their fields, in turn leaving little time for public discussion. Furthermore, specialization also ensures that experts have a more myopic point-of-view that prevents them from looking at their field from a bird's eye perspective: fewer have a vision of where the field is heading or where it ought to head to. Lastly, the initial failures of, and "hype" about Artificial Intelligence may have forced researchers to be less audacious about their visions since they do not want to be seen as incorrect in their predictions.

8.1.2 Media vs. Public

After evaluating our results we have determined that the media *does* affect the public's views about Artificial Intelligence. Our results demonstrated to us that Artificial Intelligence is not portrayed negatively. In our results section, specifically result figures 7-8 and 7-10, survey respondents demonstrate that most of the media content they were exposed to was portrayed in a positive or impartial manner. These conclusions are directly aligned with what we found in our own media analysis and research. The media does not perceive Artificial Intelligence in a negative way and it seems that the general public aligns with the media in this respect.

The open ended responses were crucial to properly gauge the public reaction to current Artificial Intelligence events in the media. These responses offered a direct perspective on what people noticed in the media and allowed for us to see relevant information about them. Creating the word maps helped visually identify popular words related to Artificial Intelligence and assisted us in categorizing the respondent's answers into standard categories. By correlating the open ended data with information about the respondents (age, occupation and gender) we were able to see intriguing trends that occurred when respondents were grouped by these factors. This led to some discoveries about popular Artificial Intelligence stories.

Based on the word maps, we found that the words "robot", "artificial", "intelligence", "Google", "AI", "think" and "cars" were the most popular words found in open ended responses. We found the words "Google" and "cars" to be the most intriguing because they directly connected to a story about autonomous car development at Google that was published during our research period (September 2010). The word "think" was also intriguing because it was often

used to describe an example of Artificial Intelligence that the respondent thought could make decisions by itself. The words “artificial” and “intelligence” were commonly associated with people who could not cite any examples. For example, many responses contained “I do not know any examples of Artificial Intelligence”.

Once the open ended responses were filtered into standardized categories, we plotted the frequency of responses against age. This breakdown showed some interesting data, including that the average age of respondents mentioning Cell phone AI, Facebook, DARPA, Spam filters or Pandora were in the older age range (30 years old or above). These graphs also showed that the average age of respondents mentioning chatbots was only 16 years old. Otherwise, the average ages for each story mentioned in the open ended responses was near or at the average age for the survey itself.

Overall, Google dominated the responses by a large margin. ASIMO and DARPA came in second and third place for the total number of mentions, respectively. Google also had almost a linear distribution across the different age groups. There were many prominent and recent Artificial Intelligence projects mentioned in the total responses—about 22 unique stories in total. Aside from the age anomalies, we found few other significant conclusions from the open ended responses, mostly because the respondent’s ages were very close together (late teens to early twenties).

Of the stories reported by survey respondents, there were only two stories that we did not discover in our own media analysis. Those stories that did not appear in our research were “Neil” and “Big Dog”. Upon further research, Big Dog is a robot built by Boston Dynamics that can maneuver almost any terrain with ease. Neil is a research project at Carnegie Mellon that learns how to read and progressively becomes better at extrapolating facts from information on the Internet. Otherwise, we came across all of the events and systems mentioned by respondents in our survey in our own research. It seems that the stories the media covered were reciprocated very well by the public from our results. The biggest Artificial Intelligence story from the period of time we studied was Google cars, and unsurprisingly Google dominated all the open ended responses.

8.1.3 Experts vs. Public

Lastly, our survey results indicate that there is a large disconnect between the public and the experts, meaning that the public's understanding of Artificial Intelligence doesn't align with the reality of Artificial Intelligence according to the experts. Our survey provided us with results demonstrating that people with lower technical skills and lower computer skills had a different idea of what Artificial Intelligence actually was compared to people with higher technical skills and the experts of the AI field.

In our survey, we wanted to determine how many artificially intelligent machines people thought they interacted with on a daily basis. Our results and analysis revealed that people with lower technical and computer skills thought they interacted with less than five artificially intelligent machines daily, while people with higher technical and computer skills thought that they interacted with more than five but less than twenty artificially intelligent machines daily (Figs 7-33 & 7-39). The latter result was much more on par with what we as a group also believed to be true. In our opinion most people interact with around ten artificially intelligent systems on a daily basis. This comparison demonstrates that for many people there seems to be a lack of understanding about what Artificial Intelligence actually is.

Another indication of the lack of understanding in the public can be found in the open ended responses. Throughout the open ended results there were many responses that said, "I don't know what AI is" or "I'm not sure how to classify what is AI and what isn't" (Appendix I). Responses like these demonstrate the lack of understanding that the public has with regard to Artificial Intelligence.

Another survey result that supports our conclusion about the public being disconnected from the reality of Artificial Intelligence is the comparison of people who have taken a class in Artificial Intelligence to whether or not the replication of human thinking in machines is possible. This comparison (Fig 7-41) shows that people who have taken a class in Artificial Intelligence believe more strongly in this possibility. This coincides with our previous conclusions that show people with higher technical skills better understand what Artificial Intelligence is and are more optimistic towards the idea that human thinking can be replicated by artificially intelligent systems.

8.2. Final Conclusions

In summary, based on our previous conclusions, it seems that there is some miscommunication between the experts of Artificial Intelligence and the public. This miscommunication is due to the media's coverage of Artificial Intelligence, which lacks experts' opinions, a problem that seems to plague most science fields.

This conclusion matches with our initial thoughts about the public's understanding of Artificial Intelligence.

8.3. Future work

Overall, this project focused primarily on determining if the public has skewed perceptions about Artificial Intelligence, but there is plenty of room for future research. Our project did not focus on any of the pop culture aspects of Artificial Intelligence such as movies like The Terminator and Sci-Fi stories like Asimov's *The Last Question* (Asimov, 1956)(Cameron, 1984). It also didn't focus on the social and ethical implications. With our survey data, particularly the open ended response data, another group could make and test hypotheses about the public's feelings toward Artificial Intelligence. They could then conduct their own survey to try to determine not what the public understands about Artificial Intelligence, but whether or not the public supports the goals of the field.

9. Experience

9.1. What we learned

We started this IQP with no idea on what about Artificial Intelligence we wanted to look at. Once we had an idea for an ultimate goal and a few ways of accomplishing our task, we began our journey through this project. One of the major things that we learned about were research methods. The first research method we learned was how to use the WPI Project database. We had to browse through the WPI Project database to find past IQP work done in our area and got practice with locating and analyzing these projects. Another research method we learned was how to locate original sources of information. We spent a great deal of time attempting to find the original source of material, mostly from newspapers articles. Most importantly, with our combined research, we were able to narrow down our extremely broad topic (the public perception of Artificial Intelligence) to prove a specific point.

During our IQP, we learned quite a bit about surveying techniques. When we decided that we wanted to conduct a survey to help gather data from the public, we had no idea what we were getting into. This was one of the areas where we learned the most. One of the first things we learned about was how to create a survey. We accomplished this by meeting with Professor Skorinko and our own research in the field. We also learned how important question phrasing and order is to a successful survey. Under the guidance of Professor Skorinko and our advisor Professor Brown, we learned how to mold the survey into a pointed questionnaire that we could get results from.

Once the survey data was collected and we closed down the survey, we had to analyze the massive amount of information we collected. This was another area where we learned quite a bit from Professor Skorinko. She showed us software called SPSS that helped us perform statistical operations on the data we collected from the survey. Because the software is quite complex, it took a lot of work to correctly perform the queries on our data.

Finally, we learned how to properly organize a large writing project. Initially, we met often to review each others work as a group and made strategic decisions on research areas. Then once writing began, we reviewed each others writing as a group and integrated it into our paper (by following our outline). We learned the importance of versioning our writing and tracking

changes made. We learned optimal ways of splitting up writing and working on revisions as a team. Finally we learned how to efficiently communicate our efforts and needs to help make the team work cohesive and effective.

9.2 How would we do this differently

Over the past three terms we have ran into some obstacles that could have been completely avoided. If we could do this project differently we would change how we went about researching and writing the first few pieces of our paper. This would have greatly reduced the pressure that we felt in the third term of our project.

Another thing that we would change is how we went about analyzing the survey. We underestimated how much time and effort it would take to sort through and analyze all of this data. When we began our analysis, we were not as prepared as we could have been in terms of our analysis layout and goals.

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11. Appendices

Appendix I – Open Ended Responses (Raw data)

Field summary for background08

Name a recent event about Artificial Intelligence that had the most impact on you.This might be a story you heard through the media or via a friend.

Answer	Count	Percentage
Answer	416	99.28%
No answer	3	0.72%

I can't remember any.
An artificial intelligent program tricked one of the judges at the loebner prize and almost got the silver medal.
Wolfram Alpha
Nothing in Particular
N/A
New York Times article speculating future of artificial intelligence
Asimo robot
Robots are becoming smarter + smarter
Google Co. working on AI
I have not heard any recently
FIRST event? I know I've seen other instances of Artificial intelligence, but none come to mind. In any case, it has a lor
Mercedes E class cars driving themselves
CS Professor discussed his experience in an AI lab as an example in a lecture.
Terminator sky net will kill us all!
AI for video games to create realistic computer players
No event has really had any impact on me but the most recent thing I can think of was a flying robot made by... some u
Surrogate (movie)
Not an event as such, but speech recognition is a great breakthrough in the field of AI.
Honestly I haven't really heard of any AI specific events recently, if ever.
Google self-driving cars.
The use of computers and learning algorithms to make high frequency trades in the stock market.
Chatter bots getting indistinguishable from humans
That robot receptionist that can react to people by sight, touch, and hearing.
First surgery conducted entirely by robots. Large amounts of human interaction, obviously, but still a major step in AI.
None
Orson Scott Card's Ender Series
My High School team won the "FIRST" Robotics competition
Watching video of AI army robots
cars that can sense tiredness or distractedness based on driving
Haven't heard any recently.
Nothing comes to mind except the artificial intelligence thing at the boston museum of science, but it was off when i we
I haven't heard any.
I participated in a research study here at WPI in which I interacted with a robot who directed me to create an anagram
Video Games
Computers that can read body language
A robot called R2 is being prepped for space.
Unfortunately I cannot remember the last Artificial Intelligence news story I saw
Can't remember a recent event.
life on Mars
The creation of Smarter cars that dont need a driver
havent read one.
I haven't heard anything about AI.
Can't remember any at the moment...
None
Computer program recognizes human emotions from conversation analysis
I saw on the Discovery Channel a really high-tech robot!
Article I read about artificial intelligence used in Data Mining
...
japanese robots

n/a
cant think of one
I constantly hear stories in my philosophy class.
not sure
finding a new compound on earth
Asimo show
self driving tractors
Saw one about a robot lover somewhere in Japan, it was funny
I can't think of anything.
The firefighting systems to detect life in the fires
Computers adapting to changing circumstances on the fly
I joined a robotics team and now I'm going to WPI.
The military using robots to defuse bombs in Iraq
I cannot think of one.
swarm robotics
I don't care
none
project in high school
None that i can think of
i don't know
N/A
A robot that resided over a wedding ceremony in Japan.
I haven't heard of any recently.
Never.
Production notes on Milo for Xbox Kinect. An attempt to bring an AI as life like as possible to the public.
A super computer was able to determine Newton's second law by recording the movement of pendulums.
Can't think of one off the top of my head.
I liked some of the highly advanced humanoid robots that countries around the world are developing
The pathfinding and general abilities of computer controlled bots in any number of games, although in particular shoote
Cleverbot
Military
Drone attacks in Iraq.
None.
robot marines
none
A story in Popular Science about robots that use artificial intelligence to help children with autism.
Stephen Hawking thinks there is deff AI, so I'm with him
haven't heard any stories recently about artificial intelligence
None come to mind.
Artificial limbs being created that can attach to nerves and be used like a normal limb.
?
discussions about it in philosophy class
The most complete form of artificial intelligence is modeled after the human brain. This brings some insight into future A
AI Audi TT driving up a mountain (Popular Science)
I have not heard about any artificial intelligence events recently.
Car that can take in signals from what is around it in order to help the driver parallel park.
Recently read article on a robot that had been implemented with a program to make decisions taking ethics into accour
uuuh...
I read about a machine that could identify emotions. I don't really think it was too far ago. I thought that it was cool how

don't really pay attention there
The experiment where part of a rat's brain was used to control a simple robot.
RoboCup
The DARPA Grand Challenge
something about a robot that could learn simple situations through experience
n/a
machine learning applied to robots working with elderly patients. the machines had several different categories, and wo
I can't remember one.
3D modeling on a 2D screen
UAV being used in scouting/attack missions in the Middle East
n/a
In Popular Science it talks about the big steps that we have made in the past decade in robotics.
none

car that can part itself

Artificial Intelligence is trying to replicate a human brain, and an adhoc information structure was discussed.
An MIT lecturer saying A.I. will begin in the year 2040.
government!
NASA space robot
N/A
I haven't heard any lately.
Dont know
discussing artificial intelligence in military robots with some friends
none, it doesn't exist as far as I know and we are still a long way away from having it be feasible
I don't hear anything about it
TSA airport scanning
I can't remember the last story I saw, but I know I've seen plenty, since I mainly get my news from tech blogs.
none
bots on the internet
The last thing I remember hearing abt AI was an article in popsci abt using AI to work w/ Autistic kids-thought this was
Saw Wikipedia article on Marvin Minsky
Some nations have become worried about the proliferation of UAV technology
the robot at wpi
I have not heard anything about Artificial Intelligence recently.
None come to mind.
ummm....
Haven't heard one...
haven't really heard much about AI in the news. haven't really had time to get much news either though
none
uh the movie? I robot?
I read about some folks using the program Massive from WETA to be the brain behind a humanoid robot.
The 4th kind
NA
N/A
I recently heard about google's self-driving cars. They've been tested all throughout California (where I live), and thoug
I have not heard anything recently.
I don't remember the last piece of news dealing with AI that I have heard...
I don't know--all I can think of is the iRobot that cleans the gutters (the next generation of the vacuum version).

I saw a speaker who talked about artificial intelligence in video games. 'Twas fascinating.
GENIUS!
nothing comes to mind
The most recent event about artificial intelligence that I encountered was with the computer AI in Halo Reach.
Google's autonomous cars
I have not heard any stories about Artificial Intelligence recently.
Recently there was an article about a research project in Spain that developed a program that can identify human emo
The development of the concept of "Strong AI." I only recently learned about this through my friend and by reading Dre
Computers that are unrecognizable by 30% or more of judges in 5 minutes of real time text based (IM like) conversatio
a
Robots that you can teach to do simple household tasks and train.
Smart Grids
I talked to my academic advisor about the AI course and what people can do coming out of the course.
n/a
i can't think of any....
None come to mind
Watched a video in one of my classes about how nature is inspiring better artifical limbs
N/A
About a computer program that recognizes human emotions throughconversation.
Realistic talking robot
N/A
there is a computer program that can answer questions/ hold a conversation with someone based off of previous conve
i don't remember
I have not heard of anything.
Automated cars at for the DARPA competition... Stanford making strong headway toward autonomous vehicles
I've heard nothing about AI in the news or otherwise.
none
None. I haven't heard any recent news.
None
I found out WPI has a class for AI, and was excited
New fastest supercomputer from China
Philosopher Susan Anderson and her research partner and husband Michael Anderson, a computer scientist have prog
reminding patients to take their medicine. A human would judge how often to remind a patient to take medicine and wh
a new device lets a paralyzed person walk again
None
Gmail Priority Inbox. Helps automaticly sort the most important mail to the top of your inbox. Basicly, a spam filter in rev
http://www.psfk.com/2010/11/twitter-bot-trolls-global-warming-sceptics-betters-hive-mind-intelligence.html
A while ago there was an article about an AI conference where a bunch of top AI people got together. The outcome wa
Can't think of one
ASIMO
N/A
I have not heard anything recently.
An AI 'passed' the Turing test a few weeks ago.
haven't heard any really good ones
Advancement in humanisms
When the news said that Artificial Intelligence tipped off the athorities to the bombs that were enroute to PA.
.
Haven't heard any recently.
I haven't heard of anything.

can't remember
why is this mandatory, what if I haven't heard anything?
Modular Neural Exploring Traveling Agent project
A Japanese robot that could behave like a human, and was going to be tested on a phone conversation to see how lon
New roomba is coming out, can remember blueprint of house to avoid bumping
Google's car had 145k miles autonomously without a crash that was its fault
Honestly, I don't recall any recent stories about artificial intelligence.
I can't remember the last time I heard about AI.
Decision making supper computers.
Dont't have one
Im not up on AI
Nome, Alaska
I haven't heard about any events regarding artificial intelligence(and why one of my friends would talk about it, I have n
the death of several people involved with the demonstration of both unmanned airplanes and turrets
Neuron-like computer hardware gts software.
Intelligent Ground Vehicle competition
Computer
none
No event comes to mind.
Google's autonomous cars.
A blind person assistance robot
Cannot think of one in recent memory, the most recent one was an article called the AI-Box Experiment, though Yudko
I don't know
Have not heard many stories, though I heard that AI computers still can't beat humans at Go.
I have not heard of any recent events about AI
N/A
I have seen several accounts of autonomous vehicles navigating a desert course. These computer-controlled vehicles
A sex robot with artificial intelligence and different personalities. It was really creepy.
no clue...
Can't think of one...
AI in Military
Tissue engineering with embryonic stem cell research.
computers that are being made to mimic human "creativity"
AI competition in the game of Starcraft, AIs would compete against one another to see which was superior.
The Matrix (movie)
Advancements in military prosthetics.
possible mars rovers based off of crabs
I have not heard any AI stories recently.
As a scientific tool, I find AI useful. Neural networks, and stories related to them, are interesting.
Google making cars
Combination helicopter and jeep article
On the web that mentioned memistors that might be able to be used in neural networks for AI
It isn't new, but still the freakiest: http://www.youtube.com/watch?v=7-cpcoIJbOU

Can't think of one.
None that I can recall
An AI machine won the Loebner
i read books, and articles, japan ROCKS
It's actually been pretty quiet lately. Last I remember a while ago they were trying to get robots to pass the Turing Test.

aaai fall symposium
The role that expert systems and their (mis)use may have played in the economic downturn
Ashimo just turned 10 years old. The robot can fetch coffee, recognized people(ID base recognition), walk and have sir
watched a show about it
Dont Remember
Robots that help care for the elderly
All the autonomous vehicles that are driving themselves. I think that there are a lot of ethical issues that will need to be
havent read one
I haven't heard anything recently.
I read Asimov's 'I, Robot.' That was a good book.
n/a
video games
I read an article about Artificial Intelligence and ethics.
none, have not heard anything pertaining to AI for quite some time. Answered neutral for following question since there
Google is creating AI.
nothing recent
cant think of any
Genetic Algorithm that controls helicopters in a manner superior to humans.
I recently watched a lecture on TED.com which featured a scientist who used evolution concepts, such as a reward sys
Google self-piloted cars.
Asimo AI recognition of objects
prosthetic hand that has feedback sensors on individual fingers so it can pick up oddly shaped objects
The MQP robot! and the Big Dog
I have read articles which spurred my interested in AI. One was about a robot that learned to use a bow and arrow and
Hearing about Google's investment in self-driving cars
Have not seen anything recently
Carnegie Melon's Nell
Can't remember one.
I don't remember hearing anything in regards to AI
BigDog
Never heard a story
n/a
Swarm algorithms
I didn't notice any, I usually just read news.
an army sentry robot
n/a
I have never heard anything about it
Damn bot sniped me in the head.
a movie about a child robot that is constructed to behave as if it would love people. (AI?)
none
Haven't actually heard much lately.
Haven't heard anything about it for a while
Android that reflects facial expressions and words of someone on a web cam (would be used for skyping)
?
Google is working on cars that can drive themselves. http://www.nytimes.com/2010/10/10/science/10google.html?_r=1
Can't think of any
nothing
don't remember a specific one
Read an article online that claimed a robot could learn to use a bow and arrow. At first I was really impressed but then

Mario AI competition looks pretty sweet
n/a
The University of Science and Technology of China's Ke Jia project
Nothing
Recent breakthroughs in human-robot interaction. Reading of human facial expressions and tone of voice and respond
N/a
A month or so ago, Google Instant was released, which attempts to deliver search results in real time based on its gues
Can't think of anything recent.
never been to one
AI for autonomous quadrotors, as that is my MQP.
n/a
http://singularityhub.com/2010/10/31/actroid-f-female-telepresence-robot-looks-super-real-creepy-video/
N/A
AI for rescuing Mine Workers
Using AI and evolutionary techniques to design radio antennas through iteration.
Nothing special.
krhf
I have been watching Ted Talks lately and they sometimes give presentations displaying things such as a functional ro
AWSRAG
genetically determined algorithms from google
Kill the robotic peen
those self driving taxis
Advances in Quantum methodologies applied to A.I. interfaces to give instant theoretical answers to complex logic.
Wall-E
none, just that I found out it's all about algorithms.
I recently saw Terminator Salvation and Minority Report and both of them made me think that no matter how advanced
A robot tried to kill me
I toured the MIT Media Lab presentation day.
I toured the MIT media laboratory
Robocup
AI in video game rivals to make things more challenger. Stories of programs coming closer to passing the turing test.
Constant talks on the subject from my RBE (with a strong emphasis on robot AI) roommate.
Cars that can drive themselves and avoid objects
UAVs and UGVs.
I have not recently heard a story about artificial intelligence
The Development of Restricted Boltzmann Machines and their use in the NetFlix challenge.
no
Google's cars that could drive themselves
Chat bot contest where the human lost
Haven't really heard anything
Honda robert
I wouldn't say that it really had an impact on my life, at least not yet, but I was intrigued by an article I read online (I beli
Singing Robot in Japan
Google is developing a car that can 'drive' itself.
facebook's algorithms deciding which posts to show me.
Creation of Netflix Cinematch has changed the way I watch and choose to watch films
I am not sure.
Uavs
I haven't heard anything about Artificial Intelligence.

Big-Dog
.
Can't recall any.
New Japanese robot, which works only by learning (it knows nothing at first).
The recent IBM Watson project and its success at Jeopardy
nothing
Switzerland AI network
n/a
Ford Motor company designing an automatic parallel park feature in their SUV... I believe this is a precursor to automat
automatic driving,
The automatic ham de-boning robot in Japan. This is the first major advance in a robotic arm replacement of a soft cutt
Never did
I heard about a robot programmed to respond with sadness if the person interacting with it seemed to be ignoring it. Tl
Some minor development in AI is misreported by the media as the harbinger of evil robots taking over the world.
The only I can think of right now is the Matrix and some other movies.
http://www.physorg.com/news/2010-11-rats-robots-brain-grid.html
It was a discussion on a podcast about AI in video games, and how important it is to have smart enemies.
A robot that would find his way from one place to another in a city. It only received help to cross the streets. The guidar
-
Intelligent Tutoring Systems
None
A technical article on the use of neural networks used for optimization schemes from an online source.
Siggraph 02' paper on machine learning for anonmly detection in time-series data
Hard to say
I don't recall.
The bipedal robot that's capable of recovering from being pushed.
n
The ability for a computer to learn about you and make decisions like you would
ARMAR-III, the Robot That Learns Via Touch
robotic soldiers
Honda's Asimo robot behaves in a very human like manner; so I wonder when will the public be able to have one a hor
none recently
Darpa Grand challenge desert race.
Quadrotor project colleague frommine
Announcement a few months back that the game of Checkers is decidable. In the same way that in Tic-Tac-Toe, the fir
roll out of the newest version of mathematica and its capabilities
AI based hospital systems
Hearing that automobiles will be able to drive humans at some point.
none
The new Apple Ipad
I do not think that I can recall a news story that I associated with AI
Article in Wired magazine about data driven research aggregated via web to solve medical problems (rather than peer-
AI is not something I know much about at all. I don't recall any recent events about AI, probably because it is not on m
None
I've heard no information recently on AI.
social networking is about as close as i get
Google Switches Gears With Self-Driving Cars
avatar work I'm doing with simulation and smart wingman
sorry, can't think of one

I cannot recall a recent event AI, nor can I recall an AI event that had an impact on me.
i am not sure what this is
na
Google self-driving car
Use in monitoring homework
A piece on "60Minutes" recently portrayed a scientist who had sustained a life form in his lab that was a genetic "offspr
know the majority of the masses are put off by science all the more,if the scientist has "lost his religion"... Until this piec
NYC sightings of UFOs 2010
battelstar gallactica
affects of videogaming, internet use on young persons' brain development.
no stories
can not recall a story
Recent sensing of water on Mars by remote devices.
Autonomous underwater robots gathering data for extended periods of time
Neil Heffernan applied for an education grant for the state of Maine
reading a story in the paper about a computer program that was a strong challenge for chess masters
do not have an experience
Pandora music selections
Drones killing terrorists
The robot in Japan that acted in a theatre production.
Facebook as a basis for AI
can't recall
My class
Autonomous vehicles - the DARPA Grand Challenge
recent advances in games
Popularity of smart phones
None.
Fringe TV show
An article in the NY Times about how AI was beginning to enable computeres to mimic human reactions

Field summary for body04-01

What do you think Artificial Intelligence will bring in the future?

Answer	Count	Percentage
Answer	416	99.28%
No answer	3	0.72%

I think it will bring a lot of good to our country by helping people that can't do certain things normal people can by themselves.
Everything
I don't think it is possible
Bring a need for improved education (i.e. more jobs might become automated with responses built not by scenario, but by customer/client personality)
Harm to the public.
Fewer jobs for people
robot soldiers
Luxurious life for those who can afford it.
General applications in servant or military roles.
smart robots
Unfortunately, it will bring cheaper alternatives to human labor, putting more people out of work. I can only hope that artificial intelligence will be used to improve EVERYONE'S quality of life, not just make big bucks for greedy corporations.
I think that AI will begin to integrate into devices to make them more sensitive, but they will only be able to do what their code tells them not to actually think and reason
A "better" albeit lazy life for humans.
The complexity of the human mind is far to great and has far to subtle mechanisms to replicate. the simple task of me answering this survey is far beyond anything that a machine will ever be able to do. how can a machine have an opinion on something, without it already programmed in? it took evolution a billion years to get us here or God, the most powerful being imaginable to create our intelligence, how can we compete?
smarter computer systems that will be able to solve complex problems at a level comparable to humans only at a much faster rate or larger amount. Computers will still be never be "creative" like a human, as computers cannot rationalize only compute and respond to the computation
Skynet
I do not think complete Artificial Intelligence is possible.
-.-
Intelligence which can no longer be classified as artificial, and robotic life which is more intelligent than humans and which will develop exponentially (and faster than biological evolution ever could).
Extremely fast answers, a self-generating database and great technology.
Safer, faster services and easier lives for everyone
Ninja robot cats
Well, I hope nothing like "I, Robot" happens...
The same thing illegal immigrant brought America through the years, cheap means to do mindless tasks Americans are too lazy to perform.
More highly developed apps Less factory jobs
cool shit!
Higher efficiency
Help solve problems more accurately.
people not htinking for themselves. Reliance on machines to function and make decisions.
Easier lifes for some but harder for those whose jobs are taken.
Maybe doing tasks like driving and cleaning, but i doubt it will get to the point where artificial intelligence can be put in positions where it needs to be counted on to make correct judgement calls all the time.
I'm not sure.
Artificial Intelligence will take more burden off of the human race. There is a possibility that Artificial Intelligence could become more advanced than humans though.
I don't know, that's the issue

Artificial Intelligence will ultimately become what we rely on to do simple tasks, so that we will ultimately not have to do anything for ourselves.
More technologies to make human lives easier despite its unnecessary use.
Faster emergency care and more accurate information
Unless properly watched along with controled growth for all we know they could bring about the end of humanity.
humans not having to do everything
smarter warfare systems, machines that can do things without being told specifically what they have to do not sure.
Death.
It will allow humans to explore other activities and learn more knowledge by taking care of daily tasks for us.
Efficient manufacturing systems and exploratory probes which will be able to navigate and bring information back without putting humans in danger.
Buncha weird awesome shit
I think Artificial Intelligence will be used to do jobs that are too dangerous for humans.
Smarter technology that can adapt to its purpose and not just simple do what it is told.
.....
unemployment, destruction of humanity, remove good qualities of human, laziness
Ease of menial jobs.
cars that drive themselves
Nothing. There's nothing it can bring. it's just humans getting bored trying to replicate themselves because they think it's cool. There are no real world implications and they are absolutely useless.
less jobs, more money to large corporations
chaos, they can be used for good but there will always be those using them for bad
Strong analyse and discretion ability that could help or even replace the role of human brain.
cool stuff
more time for humans to interact with humans. spend less time doing other stuff so we have more time to relax
Helpful stuff.
Cars that drive themselves, automated surgical robots, robotic pets (good ones, not the cheap ones)for disabled people
Hopefully faster innovation
hopefully good things, most likely bad things
Laziness
A safer, more economical way of doing things.
Many positive impacts besides of course negative ones
faster diagnosis/processing in emergency rooms, better cars, easier to use computers, overall user-friendly things
Artificial Intelligence will bring more speed and greater complew systems to the future.
the matrix
Less work for humans, probably more overcrowding
job losses less face to face communication loss of social skills faster economy production and market
Unless the systems can be perfected, then most likely confusion if something were to go wrong.
Could bring convenience, or problems.
Things that we can't imagine right now.
trouble
It will allow advance computing in shorter time, and autonomous computing, and possibly, advance human computer interaction, etc

Higher efficiency in all areas of society.
More dynamic virtual systems and robots.
A society built upon convenience but a technologically advanced one as well
A lot of debate. I'm sure it will replace many menial and repetitive jobs. On the whole I personally think that they will generally increase production and the standard of living.
I think it will bring much better interactions with computers, but never a full human replacement. Human interaction can not be completely programmed out.
New work and hopefully a way to clean up the world.
Player Piano
More human laziness.
greater technology and it will answer some questions we have
An army of angry robots
It will help machines and robots work on tasks that humans otherwise could not undertake.
Cars that drive themselves
Possibly some scientific advancements or the ability to facilitate certain processes easier.
Replacement for some more mundane jobs and tasks. However anything involving possible danger will likely remain up to human workers.
I have no idea.
lack of personal connection and a lack of social skills
faster ways to solve certain problems
Technological Booms. I hope for more submersive game environments.
unmanned AI aircraft, cars, etc.
Laziness.
I think AI will start to replace human workers for small tasks, such as parts of construction. Later on AI might replace humans in more complex jobs, but I think it will only reach labor-level jobs.
Efficiency
I think that there will be more computerized processes which will lead to needing people less to do certain jobs.
Less jobs for people is one big thing. A quicker life, people moving faster to get to places Obesity Fun different lifestyle
Like the stuff in movies. It all goes horribly wrong and robots take over.
In the near future, AI will bring replacements for menial tasks. In the far future, it is possible that AI will be able to better replicate human behavior/interaction. If this is the case, AI would have the opportunity to replace humans in many more tasks.
It will allow humans to focus on more difficult problems by solving comparatively simpler ones for us.
ROBOT HOLOCAUST!!!
talking robots
Just about everything. However, there are some things that robots won't be able to do, like certain technological developments on sheer intuition or guesswork, that a robot might not be able to do.
It will continue to allow robots and computer systems to do more menial tasks, so people don't have to worry about them. The tasks will get more complex over time.
simplicity, and lazy people.
Advanced war fighting techniques
hopefully not a replacement for human kind
It will bring a artificial workforce capable of doing the menial labor many people do not want to do
don't know.

can benefit the world is some ways, but will make people lazy and cause them to lose certain skills (ex. email has caused people to lose the ability to talk to people in person)

Could end the job industry, if the robots are durable and can fix themselves..
An 'easier' lifestyle and a higher standard of living for everyone.
promise, outlook
unemployment
a world with less jobs for people
Less jobs and the danger that it may get out of control.
well brewed coffee
better robots, advanced computers that can think for themselves
ability to organize and interperate huge ammounts of data using themes rather than just data
Productivity, but too much could bring fear as well
less jobs for humans
AI will bring smarter systems, which make human lives easier. It could also reach the point that human and artificial intelligence merge, utilizing the speed of artificial circuits with the pattern recognition of the human brain.
easier, unnessary, way of life.
if not put in charge of vital systems like government or nuclear weapons, they will bring massive unemployment due to their takeover of manufacturing and many other service markets such as the taxis you mentioned before. unemployment leads either to the dismantling of the machines or government collapse.
aids to the disabled and elderly
Free labor to corporations so that they don't have to hire people.
New technologies and advances
better run soceity
I don't know.
Faster and more repeatable production and problem solving capabilities
more efficient work/production
War.
more automated systems such as restaurant serving, taxi cabs, cars, etc.
awesomeness!!! woooh!
Robots that will bring me food when I am too lazy to get up
I think it will bring along even more automation than we've ever seen, which could lead to either people no longer having to do boring jobs/being able to follow their dreams or it could lead to people being even more lazy and degenerate.
Humans will no longer do tedious task such as brushing thier own teeth or wiping their butt.
Easier life.
Cyberdyne
I think it will brig increased automation to simple and mundane tasks, but that people will be too afraid to allow it to replace people in certain circumstances. It could possibly get to the point at which ai reaches close to the abilities of the human brain (and in some areas certainly beyond it), but it is inherently limited by the lack of ability to do things that aren't reason-driven (e.g. intuition, pointless but enjoyable things, etc.).
Smart technology over seen by humans i.e. smart grids
Social problems - there will be a lot of commotion and division between people because many people will be scared if one day robots can replace humans
Transportation.
Fascinating moral problems to face, but also more effective programs and devices capable of reducing the burden on the individual from menial tasks.
it will make humans lazy and fat

Death and chaos
Smarter software. This can be applied to almost anything: gaming, advertising, work.
All manner of changes. Greatest is continuing the ongoing replacement of menial jobs, allowing more leisure time for privileged individuals, as well as even more managing of information at scales beyond what any humans could manage.
Less jobs, more help.
Faster interpretation of information, and the delegation of simple tasks to computer thinking.
The singularity.
AI has potential to bring great benefits, but, like all technologies, must have checks in place and be used responsibly.
Be able to not have to drive cars the cars will have sensors and GPS to track its course and react to its surroundings.
Good ad Bad. Good because it will be able to help with hard or dangerous jobs. Bad because it will also take away normal jobs from humans and make people lazier.
More laziness in the human race.
Safety for our soldiers, as well as replacing the need for humans to do surgery
Robots
not sure
Artificial beings able to make conscious decisions on the spur of the moment, acting as a human in the situation might. Likely working as an objective perspective to compare a human, subjective one to.
It is uncertain. It is very hard to create AI because humans are able to infer many things while robots and machines must be given options for every exception.
depends entirely on how its handled
Just look at the Movie i-Robot. We are all fucked.
Replace mundane tasks.
I do not know.
Further complications and complexities in daily interaction and philosophical and ethical questions about the meaning of life.
cars that drive themselves and even more machines replacing human workers and military people
Robots that may cause more harm than good.
Increased productivity and automation
People will be anti social because they will hang out with customizable AI rather than real people.
Less jobs for teenagers and immigrants.
No use for humans in manufacturing.
Huge technological improvements but if not controlled properly it can affect in an extreme negative way the human society as a society
Awesomeness
Easier communication to electronic devices
Greater Efficiency in performing tasks but giving up a personal interaction.
an easier life
better solutions to technical problems.
Computers that serve up content before you even know that you want it. Just generally making life more efficient.
Safer and faster transportation.
Artificial Intelligence will aid humanity by being able to conduct research and production 24/7 to help us with many problems who's solutions lie in technology.
More insight into the world.
Easy life
more or less gore

It is and will be more effective in the future for medical and safety purposes. However, I feel it will be abused as a means of power and weaponry.
More interactive machines and appliances and more controversy.
fewer minimum wage jobs and/or significantly faster research
Less physical labor / monotonous jobs, people will need to increase their skill set or will be unemployed.
Scary things.
not sure
Fewer untrained jobs.
Ease of access of a variety of things.
an army of robots that decide to exterminate the inferior human race.
Nothing but nothing.
A complacent society...the majority won't have to think, and people will become even more "plugged in" then they are now.
More efficient streamlined processes with no feelings.
more efficiency, labor jobs disappearing
Autonomous robots that do some of our tasks for us
It's looking like our cars are becoming more intelligent. I'm assuming that one day, when we get in our car, they will drive themselves once we give it the destination.
I hope it brings machine that can go into war so we don't have to send real people and risk their lives.
AI hold a lot of potetial to do good and to do bad. It is really up to the people who design the system to determine whether their creations will be instruments of terror and distruction or instruments of peace.
Accuracy, rapid speed, isolation
fantastic thining machines
Automation to everything we do.
AI will probably be used for entertainment value and not work. They lack common sense.
Fantastic things. Whether fantastically wonderful or fantastically terrible, I don't know.
Automation of menail jobs, forcing a shift in society towards high tech. Both a boon and a problem, as millions would be forced out of work.
Reduced danger because systems will be able to react to humans who are not following behavior norms (IE an autonomous car will stop if someone is in the crosswalk even though the light is green)
New Technologies
safety
Machine behavior closer to human thinking specifically applied in many subject or job areas.
Massive robot armies, robot wars, perhaps a robot rebellion, and then The Matrix.
A better life for those who can afford it
It will bring systems capable of performing menial tasks with enough intelligence to vary their work to suit minor fluctuations in the work load. I believe it will be a very very long time before a system is capable of replicating the so called "out of the box" thinking that makes the human brain a good problem solver.
i dont know
Too much technology, wasted resources, devaluing of people, devaluing of emotion and caring, distancing of people from nature, false reality, technology for elite but the poor would be left behind
doom
a more efficient society
Artificial intelligence will provide increasingly useful supplements for human activities, but they will not be able to replace our complex mental and physical mechanisms for several centuries.
Lazy humans
more laziness to humans.
Easier interactive interfaces.
better living

Immortality Easier living
I am not sure, yes it is wonderful in all, but its a machine. Machines have problems. They are made by humans. Interference etc etc things can and probably will happen and we dont need it to be for the worse. what ever happened to working the hard way being human.
It seems like in the short term they'll make life a lot easier for humans.
Either benificial to mankind, or its downfall
Depending on the rate of technological advancement and the ability to control the systems we create, we could see A.I. either create great economic growth and world balance or a technological takeover and eventual nuclear downfall.
a highly autonomized world
A lot of headaches in the debugging, customer support, and human relations departments
AI is, for me, a tool. It will enable more rapid technological development along with myriad other changes technological, societal, or otherwise. That said, I doubt I will ever hear of a computer solving something on the order of difficulty of one of the Millennium Prize Problems.

Robots
Well if used correctly it will be a great tool to help mankind if abused it will replace more jobs than it creates and big business will use it as cheap labor and people could be put out of work
Singularity...
more efficient machines
Less reliance on error-prone humans.
Supportive Robots
Hopefully it'll be able to run the household so I don't have to.
lower class, and production lines, driving is far away, waiters etc soon.
People becoming increasingly reliant on them and ceasing to think for themselves.
More advanced machines that perform more and more like humans but never able to replace them...
A better understanding of all the natural sciences
Humanoid robots capable of helping people. Operating system that will know exactly what you want to do (no user interface necessary)
Laziness in humans but increased productivity
Help in areas that need it but also more confusion
Lots of convenience. Creation of lots of jobs for maintaining these intelligent systems. Destruction of a lot of jobs involving manual labor
Not sure.
promises
Can't say.
A cleaner world. And people will loose thier jobs at McDonalds. But that's more automated robots than inteligent ones...
I think it will make people lazier.
progress towards humanity's ultimate goal of seperation and independance from nature
Lots and lots of robot sexy-time.
Automation
iRobot the movie. We're fucked.
smarter applications
less jobs for humans

First, there will be a society free from want of physical labor, where value of a person is determined primarily by intellect. As automation progresses, eventually there will not even be a requirement for humans to be intelligent, only skilled at a very specific task that hasn't been automated yet. They may or may not even understand the purpose of the task that they are assigned to. Eventually the planet will become fully automated and self-sustaining, making the presence of humanity -once the world's caretakers- optional. What will follow will be an age of hedonism and ennui as humans grasp for a higher purpose. Either the lavish consumption of the humans at this age will cause their further loss of balance and natural purpose, eventually causing them to voluntarily die out as reproduction slowly halts, OR the emotions and behavior of the humans will be strictly monitored and regulated by the AI Oligarch to sustain the society's emotional state indefinitely. Due to the AI's supposed preset responsibility to monitor and sustain us, the latter is more likely, though it generally hinges on whether the system is defined completely by a set of dynamic heuristics or there were a few a priori rules set in place by the original designers to prevent a malevolent entity from being generated.
Simplified and easier life for humans. Less daily chores and menial tasks.
A smaller workforce.
soliders
All menial tasks will be automated by robots
I think they'll replace some simple actions of humans, like operating public transportation or doing tasks that may be particularly dangerous for a human
It will augment human ability, just as computers currently do.
Peace and prosperity
A long debate on if it's good or not
Joy
An easier way of life for most humans, but a huge lack of jobs. They will have to be created in other fields.
I think it will create a very different lifestyle. I don't know if that lifestyle will be one where people are more dependent on the AI, which is most likely the way things will go, because we believe that these machines can think better for us than we can for ourselves. I mean look at the commercials about smart phones, the ones where it portrays the smart phone as being the one that says whether something is real or not, what the right switch is etc. Those kind of commercials basically say we should surrender out own problem solving and strategy skills to these computers.
May be able to make things simpler in the future.
Nothing
at the begining alot of good then a fat population that will be useless
better search engines
I don't care
controversy
robot domination
They are smarter, technically, but they will not have the creativity and emotions that humans have.
Even less people who know how to drive than there already is.
humans get more and more replaced and replacable, more machines wich could be really helpful and great when controlled and used in the right way but higly dangerous and destructive when not. the border between 'life' and 'machine' gets more and more blurred.
taking jobs
Laziness and obsolescence
Higher Unemployment
A pressure on human society
various science fiction scenarios
more exciting video gaming, and maybe more stuff like this http://chris.pirillo.com/robot-presides-over-japanese-wedding/

Semantic text analysis on the web; advertising even more individually catered to the user
a machine or robot that replaces human jobs, but we are still fairly far from that, and people will be upset if they lose their job to a robot
depends what the government wants to use it for. Also, you need 'don't know' or 'not sure' options for a lot of these questions.
Artificial robots have already replaced humans as car manufacturers and other factory jobs. They will bring lots of conveniences.
a machine that can pass a Turing test with me in (15 +/- 10) years
Armageddon
A better understanding of human thought processes and memory, behavior counseling, companionship.
New technologies and breakthroughs.
Decreased workload for humans, maybe ending poverty.
I'm not fucking Nostradamus.
Self-driving cars would be a huge benefit to society, and I'd be surprised if we made human driving obsolete in the next 30 years. Machine translation and text understanding will continue to improve.
systems which are more adaptable to different types of problems
don't know... really
More efficiency and productivity.
n/a
Great technological innovations and scientific discoveries
Probably more automated systems, but little more.
Less menial jobs
Automated systems that can replace humans for boring or dangerous tasks.
More efficiency for our life.
kl;j
I will bring better ways of analyzing data, allow people to replace limbs, and play a major role in military situations.
scary war
awesomeness
Fear
Either an extremely high standard of living for all humans, or the extinction of humans
Rapid R&D, A.I. enhanced or created systems or media.
laziness
Stuff
Even though the movies (that present their stories about Artificial Intelligence and computer advances in human life) are unrealistic, but it seems, with today's technology, like it's heading in this path.
Epic waffles
The ability for tedious, repetitive, everyday tasks to be handled by a robot.
Robotic assistants which do the dull, dirty, and dangerous tasks that humans do not.
WW 3
Better video games, more intelligent interactive systems, safer environments.
Software that learns a users needs and adapts to them by making them easier or, eventually, adding them.
Take away many jobs, but also open many new possibilities for jobs. It will make many tasks we do today easier.

AI, like most technologies, is to make human life easier. There are also social impacts on today's society. People are becoming more dependent on new technologies such as smart phones. And people sometimes show withdrawal symptoms when force away from that device. In the previous question, I don't know the answer, but imagine that the technology at those levels won't be here anytime soon. Also it's vague. Machines can replace jobs for their number crunching and computing abilities, but still need at least one person to run them.
Less error in many things were human error is a major fault
More intelligence. ;-) It is said that Humans are not intelligent enough looking at the mess they make with things.
convenience
Smarter energy use
Better research, more take over of human tasks
Advanced technologies and tools that humans can use to perform tasks
into family
Changes in the job market. I am not personally worried because I work in engineering and it is unlikely that artificial intelligence could replace me within my lifetime. However, I do expect many lower-skill jobs to be replaced by AI. This will put many older people who relied on such job (such as the aforementioned taxi driver) out of work. Many of them will have difficulty acquiring the skills needed to find a new job that requires a higher skill set. This will in turn put a burden on unemployment benefits. Another effect I believe we will see is the decline in illegal immigration. As robots start to take over the lower-skill end of the job market, there will be a reduced incentive for people to immigrate to the US illegally.
New Social Presence
Not sure
cars that drive themselves, world domination
I think in theory they could speed up an already break neck innovation pace
Efficiency, and convenience.
Lazy people! Ever seen surrogates? In reality i think that AI will allow people to worry about more important tasks and they will leave the remedial tasks for AI machines.
Replace more occupations with machines.
Unemployment for the unskilled, scarier spam-bots, better medical developments, better standard of living.
.
Do the things people don't want to be bothered to do.
Help for food production and dangerous/boring jobs, therefore increase average education level.
Automation of simple repetitive tasks, as well as insight into behavior emerging from large data sets
nothing good
Peace
* The means to create agents that can perform menial tasks. * The means to accurately simulate real events on a computer.
Should enable the mechanical tasks to be performed without human supervision... More an extension of what computers do, but little more intuitively. In physical terms, I'm not sure what the impact will be.
convenience in daily life
It'll start as a ham de-boning robot, and proceed to a more adaptable system. It'll bring more complexity to what appears to be a simple world today.
Save lifes...time
Honestly I have no idea because I rarely give any thought to the topic, but I imagine, given the example above about intelligent cell phone applications, that it's not unreasonable to think that there could be some artificially intelligent home-control system that would be able to design heating/coooling/light patterns to match the mood or schedule of those present without prior programming. Or something similar.
Robots named Bender Bending Rodríguez.

It might bring some good. But it might be controversial.
Other than the convenience of handling certain dull, dirty, and dangerous jobs, artificially intelligent machines will actually improve upon the performance of humans in complex and/or repetitive tasks. An example could be sections of a city or highways where all of the vehicles are controlled by artificial intelligence. With well developed AI specific to this task traffic will flow smoother and there will be less accidents.
It will bring an easier life for us humans. Artificially intelligent machines could do a lot of work for us that people wouldn't want to do.
They will bring more automation to our society. They will also bring ethical issues, which for me do not exist, such as robot "human" rights.
The Human Offload Engine
Replacing people who do menial tasks with machines.
Me not driving and the robot wars
A philosophical argument regarding the nature of intelligence and differentiations between intelligence and concept of a soul.
Awesome wars
Lots of great things
enhance quality of life?
The singularity, maybe.
World Peace
Make life easier.
It will help build smarter machines that will perform more complicated tasks.
cheap labor
Automation will expand beyond the manufacturing places and into the home, the office and other public places.
less need for human interaction
Total instant information, with more link ups to the nervous system (e.g. heads up display)
Improve basic household and industrial chores
The question isn't to replace humans, as posed above. Rather the idea is that automated helpers should be able to support humans in tasks. This might include problem-solving mundane tasks or interacting with humans via brainstorming sessions.
elementary at first, but very rapidly advancing (within hours/days to out think humans)
We can hope for a world of mundane tasks replaced by AI based interactions
Human intelligence without human emotions.
Radical change of life as we know it.
More Effiency, less human error
I think more generally of AI as "intelligent systems," but this is significantly different than creative human thinking. Creative human thinking, like most of the great inventions or mathematical discoveries, require thinking about something from a completely unknown perspective rather than logical extensions of existing thought. For example, see the development/history of complex numbers (square root of -1) for which the logical extensions were already in place, but had not been put together.
you need some help with survey design - it is not a good idea to demand a written answer if people don't have an opinion. people are smart - they'll just make things up.
I think your questions about AI are somewhat vague. For example, if you ask me if "AI will replace humans?", I would say NO, BUT if you ask me "Will taxi cabs drive themselves?", I would say yes. You need to define what you mean by "replace".
Automated railroads, roadways, etc.
Perhaps some conveniences, but probably with frustrations to go with them.
more intelligent decision making

Most of the contructs like the doctor and Commander DATA on Star Trek will become true with the exception of the transporter
safer systems for humans. better training solutions for repetitive tasks
increasingly a society of people disconnected from each other
Reduced costs for services, improved reliability of services, and reduced need for human intervention in dangerous environments.
dehumanization. change in the basic structure of our world as we now know it
both good and bad... could be great applications that save time and improve efficiency, but also some tough societal implications possibly (loss of jobs, etc
no idea.
more efficient processes
More & more "human' jobs will be taken over by AI-some for the good & a lot for the bad..Depends who's hands are in the proverbial cookie jar
efficiencies
 fear and hope
decreased social interaction; lower attention span, greater speed in producing "intelligence"
not certain
cars that can drive themselves
Machines with less operator errors than humans.
Free humans from mundane tasks so that we can concentrate on higher-level, more creative tasks
very specific applications that work well.
the ability of our society to produce more and accomplish more with greater efficiency
iam not sure but I don't care
less war
Both better performance in some areas and potential dangers in others.
a labor force. Helpful assistance in the home, and community.
Smarter cars, homes, computers, energy systems, financial systems and more
Benefits
functionality
AI is already happening. By your definition systems like voice recognition ARE AI.
Certain advances i am unable to articulate
Hopefully, smarter means of transportation.
Nothing much of value.
robotic assistance i.e auto making, processing food, air travel
The ability to work more efficiently

Field summary for body04-03

How do you feel, emotionally speaking, about Artificial Intelligence replacing humans?

Answer	Count	Percentage
Answer	417	99.52%
No answer	2	0.48%

I think in some cases it can be good, and it will help a lot of people. But in other cases it will replace things that were reserved for humans only and could be bad.
So long as they don't eliminate us and instead allow us to live in some sort of paradise.
It's not okay
I do not mind it. There are Texas Instrument calculators smarter than people, but I believe that Artificial Intelligence will still only focus on specific tasks for convenience's sake rather than functioning as its own organism anyways.
I don't feel comfortable with Artificial Intelligence replacing humans. It may lead to loss of jobs. Something may go wrong as well. Even though it is natural to evolve with technology, I don't think its right for Artificial Intelligence to replace humans,
neutral
afraid
Great to know that humans may create things smarter than them.
I don't believe it is actually possible, but I feel that it will in turn create more jobs to monitor AI.
If it were possible I would be nervous. However, I do not think it possible, because a human would be programming/building the intelligence thing
I feel it's fine, so long as it's is improving the quality of life of everyone, and not being used at the expense of another. This, of course, depends on how you define "replacing." The hope is that the human you replace will be able to continue doing something more meaningful. I am quite comfortable knowing that artificially intelligent drones are being used in warfare, as this reduces the number of troops we need stationed in dangerous locations.
I think that it wont happen. It may replace jobs and if they can do a job better than a human let them.
I'm excited at the promising prospects of AI for preforming tasks difficult/tedious for humans to preform. However, I'm worried that if AI does too much thinking, humans will start to evolve backwards, and become less intelligent.
cant be done
you can't remove the human element from the systems; a human must maake the AI; an AI cannot create an AI better, else it would not be better
If true artificial intelligence is ever created (singularity) I doubt it will be the end of earth or pull a skynet on us. I think it would be really cool though.(I never actually saw the terminator series btw)
I do not believe this is possible.
Perfectly fine. It's not a threatening topic, it's encouraging.
I'm excited for it. Humans are fine and all, but I'd like to see them produce something greater than themselves, and I'd like to benefit from such beings as those.
Strong. Humans are never going to be replaced because of it's uniqueness, and robots and humans are going to coexist, probably something like the borgs, but not so dark.
I think it's inevitable and a landmark development for our future
Whatever
What use would there be for us anymore? Morally and ethically, it can't be done.
Ray Kurzweil believes, and I do as well, that AI sentient beings would consider humans their makers, and consider them with a certain amount of respect. So, I'm not too worried about this. I'd love for my consciousness to be uploaded into a computer.
They won't have the human element of emotions
IT'D BE TIGHT!
It's a myth, have no emotions about it since it won't happen.
not sure
creepy
It shouldn't replace them.

Some things I don't think can be imitated artificially. Emotionally, I'm fine as long as it doesn't get out of hand, which I don't think it will.
It's interesting, but a little bit scary in that our world will be completely different and I think people will forget how to think for themselves.
I feel scared, that someday, there will be little use for a human anymore if the Artificial Intelligence can do more than a human can.
Bad
Artificial Intelligence may be the demise of our society. While some of these types of intelligences will definitely benefit society, the result can also hinder the advancement of humans as a race. The idea that humans will not have to think about things for themselves and perform simple tasks may put us at risk as becoming obsolete as a race.
I believe an AI system will not replace human system. I may be wrong so in the case one does begin to replace the need for a human I will react accordingly. I will be baffled and appalled that humans have gone as far to make a technology that destroys human interaction.
Unsure
I don't feel too bad about AI replacing humans for menial tasks but when you give them jobs that greatly impact our lives that might make me worry a little.
ok
I dont think it will ever happen, if it did though, I might be a little worried that we would lose control
It won't completely happen.
Bad.
I would be fine with Aritificial Intelligence having the option to replace humans, but each individual should have the right to choose whether they want that for themselves.
They could only be as good as their creator.
Machines can't ever be nearly as versatile. Sure, they might be ridiculously better at specific tasks, but not everything. I'm actually excited to see what people come up with
Well Artificial Intelligence will never replace humans completely - humans are needed to create Artificial Intelligence in the first place.
I think humans will always have a place but I also dont think my field of study is going to be replaced by robots so, I am not scared and am open to an AI future
not good
not good. If everything can be substituted by Artificial Intelligence, then it is no use for human to be in this world anymore.
Won't happen.
it may be very helpful to society as a whole
There's no way you can replace human emotions with a computer. Honestly, i feel like this is all computer scientists do with their lives because they're so lonely.
disheartening but cool
I don't like it, I don't want to rely on a robot for completing some task. I think it is important to be human, to feel things, respond to situations based on past events.
Neutral, they are man-made.
good
I dont mind it for some things, like driving a cab, but you cant replace humans and no one ever will
It's weird.
I think that it would leave a lot of people unemployed, wreak havoc on our economy and force people to reevaluate our skills and way of life.
Integration/assimilation is inevitable
that sucks

I think it would be cool for some things, but would cause an eminent disaster when they start thinking on there own.
I am indifferent.
not so positive
a machine could never replicate human emotion, only problem solving based on facts. a computer is only as good as the human that programmed it
I feel excited about it.
it won't happen, so i don't care.
Don't care
with certain jobs its okay but somethings shouldn't replace humans
Worried
Scared
I am not a big fan of that idea.
Just more competition.
I believe we should be wary of making such advance AI's commonplace. We shouldn't let computers replace us.
As long as their purpose is the betterment of society and than no one is harmed physically, mentally, or financialy -as in losing their jobs and becoming unemployed- AI is a wonderful thing.
Fine? I don't think it ever will, digital logic cannot replicate the operations of the brain
I do not think that a machine could ever replace a human emotionally however in logic and reasoning skills they do. But do we want to take that risk in putting a machine in a humans place? (Think i.Robot)
It depends on what you mean with the word "replace." If they do a job more effectively I think they should be implemented immediately.
I don't like the thought of that. It makes us lazy or useless, neither of which is any good for us.
Not good.
I don't trust something with a lack of emotion.
Fearful.
awesome
Sad
As long as they don't replace us entirely.
I'm not too worried about it
Personally, I believe artificial intelligence to the extent of replacing humans should not be persued.
I don't believe that a machine can fully replace a human. In some aspects they far exceed human capabilities, but a machine cannot feel things such as emotion.
Ambivalent.
okay
It would suck it it happened
I guess if things worked out properly, there'd still be social order, without the necessary work, so I'd have alot more hobbies. Of course, this is from the optimistic point of view.
Some things good, some bad (neutral)
That is ridiculous.
It is a little scary now, but I think as this starts happening gradually, it won't really be a shock, and I think that AI will mostly be used in laboring jobs.
I feel AI cannot replace human beings because we don't know enough of our mind to program it.
I don't think that AI can ever completely replace humans. I don't think it is possible to program in feelings and emotions. It would be very complex to program reactions to every little piece of surroundings. When it came to a job that involved morality or something to that affect, AI would not be able to make the choice based on feelings but on programming.

I don't feel bad about it. I know that there are a lot of movies and stories that portray Artificial Intelligence badly, but I don't think that it'll be bad, at least not like robot-killing-human bad.
it kind of sucks that there might be something that wil replace you and do a better job at it. don't know how it will turn out but it could be that life could be easier
Weird. I don't believe they should. everything seems to be just fine now. And theres no telling what could happen. Besides, intelligent robots would take away jobs which are already scarce.
Excited but wary. I am interested in the future of AI, and how far it will progress. However, AI is often portrayed in a bad light--many people are afraid of (advanced) AI. Public opinion is one of the biggest hurdles when trying to implement AI into the world.
Some things cannot be replaced or emulated by a computer. However, I believe that there are a great deal of applications for artificial intelligence.
Ermm...very unlikely. teach a machine to juggle a soccer ball and maybe i'll reconsider. in the event that it happens, robot holocaust, jokes aside, is not a far-fetched concept.
scared
If the AI could be promised to be benevolent, then I don't have a problem with it, since that means we would have a future guaranteed with a minimum of world violence, a maximum of technological and scientific innovation, world hunger nullified, environmental damage, including global warming nullified, the majority of traffic accidents nullified.
It depends on how much they replace us. If they try to pull what skynet did, then I'm not thrilled with that. But if AI just keeps making life easier, than I have no problem with.
i dont think the world is ready for artificial intelligence now. later on, maybe.
Unconcerned
don't want it to happen... we should never create machines that can
It can never replace humanity, it should only do menial tasks
don't know.

can be both good and bad
unsettling
It's wierd that something made by humans can be better than humans.
It doesn't bother me too much, as long as we can still turn them off.
scared
I feel there is alot of dilemma going around with this because it is wierd that the most developed specie in the planet develops a MORE developed specie. It does not make sense to me
i don't like it
It scares me to think that a machine could replace a human and think better than a human.
well
an AI can never completely replace a human being, they lack intuition and emotions that humans have
I feel that there is always a need for humans to understand the technology well enough to interperate and change it
Freaked out
they are a positive advancement in our society if used correctly
I'm not sure it will really "replace" humans. I believe it will enhance our own abilities, but I'm not sure that we'll be seeing some sort of robocalypse from a real Skynet.
its not good. seriously the termanator could become real, and that would suck.
I am not afraid of the AI replacing humans, but I would be a little scared of the humans who get replaced.
depends on what for in some cases like helping people that would otherwise go unaided i'm in full suport.
It is a natural process, just like humans replaced monkeys and other primitive apes..
Depending on how this replacement is conducted, the result could be disasterous (Skynet, for example), or a benevelent takeover. I feel that it has the potential to go either way.

its ok i guess
It should not it is not possible for Artificial Intelligence to replace humans since they are programmed by humans and humans cannot know everything.
I think that it will be bad for humans because it will destroy the economy and the only people with money will be the richest, and there will be very few jobs for anyone that isnt incredibly gifted.
eh whatever. I don't really care
It's not kosher.
long way to go. so many possibilities of errors, yet a lot of potential behind the idea for menial tasks.
reallllll jealous and sad that im dumb
neutral. sucks to be replaced in work though
Computers are great at certain functions, and can make use of many sensors which perceive what we cannot, but computers will never reach the creative potential we have. There will always be human input behind the computer at some level, even if said input is greatly reduced.
Never will happen
Not concerned.
An interesting but unsettling prospect.
There is certainly a feeling of inadequacy that accompanies being replaced, especially by something that can do your job better than you will ever be able to do it. I think that having machines replace humans in some cases will be useful and interesting, but that there is so much merit in doing things for yourself (even just to screw them up) that I would be against complete replacement.
I would feel glad in some places as replacing humans in manufacturing but scared if you're talking about an A.I. replacing humans by euthanasia.
Worried. Humans have feelings. Robots cannot be taught how to feel or think emotionally and so this can alter the way robots work.
I think it's playing God--nothing can replace the masterpiece of life that He created.
It all depends on the overall impact of the replacement. Just because we can replace some job with AI doesn't mean we should; As with anything, if the social, moral, and economic benefits outweigh the costs, then I say go for it.
it kinda sucks, but as long s it's controlled it's alright
It's scary to think terminator may some day come true.
I don't think artificial intelligence can ever replace humans. Humans wouldn't allow that to happen.
I do not believe it is possible. Human minds, for some unknown reason, have an ability to "step out of the system", and think on multiple levels, that no form of porgramming even theoretically conceptualized at this point can reach. At best, a brain could be simulated, but this would not be a programmable artificial intelligence, but rather a simulated human who would have to learn the same way as a real one. Compared to machines which can be made to do tasks, humans will always retain forms of thinking and creativity which are impossible in a computer, so jobs relating to the human spirit will remain.
Less jobs, more help. Not a fan.
Meh.
Uncomfortable.
AI would be useful in replacing humans for mundane tasks, but I feel a little uneasy about AI taking over complex tasks such as problem solving or design and engineering.
If it does happen, I don't think it will happen anytime soon, at least in the next 50 years.
Against it...?
That we are progressing in technology but maybe making it easier for some people to slip through the cracks so they don't have to think as much.
I am not worried about this.
I little worried.
I don't think it's possible, and if it were, why would humans still exist?

Could be useful in fields where objective immediate decisions are needed. Unlikely to replace humans in more social or day-to-day basis.
I don't think it is possible.
worried/intrigued
I feel very uncomfortable about it
They cannot actually think just replicate what is told.
I do not think it should happen.
I wonder if AI beings could develop intellectually in a different way than humans that can't completely be understood. Which is something unsettling on some levels. People really can't control every factor...
scared
Indifferent.
If AI replaced the existence of humans, I would not be happy.
I doubt it will replace humans, as a species we tend to multiply uncontrollably, so it'd be difficult to keep up with us.
I don't believe it will because of limited ability for emotional range which is the core of being human.
That'd be bad.
I am scared of it and do not totalle agree with it.
Thats a terrible Idea
N/A
It depends on what it is used for. For example a self checkout at a grocery store is a good idea but if you were to replace something like customer service with artificial intelligence it might be more difficult because that deals with a large amount of personal interaction.
i think it is great
I don't think that it will happen.
It's fine.
Negative
For replacing us in jobs and war, as long as the humans are not hung out to dry, positive. For replacing us as a species, only positive if humans are given the option of uploading their minds and becoming "AI" ourselves.
It won't be in my life time so I'm not going to get torn up about it.
wont happen, so not worried about being replaced
it doesnt matter, they will be fun to kill
Artificial Intelligence will not replace humans. Nothing will ever be perfect, and whatever we make as humans cannot be outsmarted by us. If there will be Artificial Intelligence that does replace humans, I would feel threatened.
Like a factory worker knowing that his boss is buying a machine to replace him, but he still has to feed his family and how can he do that if he has no job.
it is unlikely, so not concerning
'Replacing' is subjective on how humans define it. Anything that makes decisions 'like a human' again is only as accurate as we accept it based on our opinions of what is human nature, and how well the system imitates it. If we don't accept it as intelligent exactly in the same way we consider a human individual intelligent, it does not replace a human.
I don't think it's natural and I feel like the human mind is too complex to be able to be replicated by a machine.
not good, there are some things that artificial intelligence can't do, that humans can
It's fine, as long as we prepare an infrastructure to survive economically, and they don't turn evil.
I disagree with it.

well, I wouldn't want to be replaced. would you? besides, the more jobs computers and stuff take over, the less people will be needed for those jobs. this may very well result in more crime and/or homelessness than anything else.
It won't happen.
The thought threatens my pride a little bit, but I'm mostly indifferent. I'm not scared as long as we can maintain control of the machines (a fear that has been expressed through many movies and books)
Mixed feelings.
it is a tad hard to see people's skills being replicated by our own creations.
Great, less work for us
When you have been exposed to movies such as the matrix, it kind of freaks you out, you know? Or iRobot, or any of those. I don't feel like artificial intelligence will be able to properly emulate human emotion.
AI can't replace a human brain because emotionally we base our desicions on our past experiences and how we felt about those experiences, so I don't think AI can feelings... The reasoning whi AI does something can't compare to why a human would decide something.
Not good. Nothing can replace humans.
Amazing that humans can create something that advanced
I would rather think for myself thank you
It is not possible, I would feel frightened.
It's never been a concern for me. Fun to watch in the movies though.
cold and distant
I personally don't think that computers can replace humans in some respects, such as art and creativity. I don't really want to be replaced by a computer
If it improves the quality of life for people, then sounds good to me
Netural
scared
I think it's a testament to our technological achievement, alothough I don't think AI will ever fully replace humans, since humans create the AI in the first place.
AI could replace humans in jobs, but then people could not make money, and the economy would collapse.
This is a bad idea. Also, robots should never replace human connection, such as robot spouses and lovers.
i think it may happen, but i don't think they will attack humans
I feel like i will never see it, and emotionally think nothing about it.
fine
Very opposed.
uncomfortable
good for some areas bad for others
Artificial intelligence would destroy the delicate natural balance that the world offers if they replaced humans. I certainly hope that this event does not happen during my lifetime.
I dont care
Not too positively. Each individual has different characteristics with the way they think and I don't believe a robot can be programmed to make an emotional decision. We were also put on this earth for a purpose, which was definitely not to replace ourselves by robots.
Hmm...interested.
IRobot
Not concerned
Negatively. I think it is awesome and all that we can create these things. But... where did working hard as farmers etc etc go. Computers do everything. We need to live our own lives. yes they help with research but sometimes we need to do that research not a machine. Sometimes we need a machine and thats ok but them taking over is just a little too much.

To replace humans, an AI would have to have basic survival "instincts". Without the fear of death, they would eventually perish. However, AI would inevitably know that they are machines. How would a robot deal with the idea of death knowing there is no afterlife for them?
That will never happen
I do not believe A.I. will ever be able to fully replace a human brain. Robots are created to preform a certain task a do not have to deal with the fears and daily problems that come with human life.
i don't thnk they will
Very negatively. Humans evolved into thinking beings, thus bringing with them a certain "human" element. This is something you cannot create from scratch or design.
It does not bother me one bit. In applying for a job, if you are better than me at a given task, you should get hired. If AI can outperform humans, AI should be used. Humans should devote time elsewhere.

Not comfotable
I think their is a place for AI and i think also their is a place for humans, i think a balance can be made
Not replacing, but working together, in parallel... I feel our brains are going to extend to this universal world wide computer
I'm not too worried... it makes sense for intelligent robots to be used in place of humans to eliminate errors in certain fields. As long as humans aren't completely cut out of the system.
It's fine as long as they don't replace all humans. If the story ends like the more recent Charlie and the Chocolate Factory, with jobs being created to repair the robots that once took away jobs, all will be well.
It won't happen with correct restrictions, so I'm not fearful it will happen
That would be crap. I wouldn't want to be replaced. Would you?
they will not be able to take our individuality
Not alright, rather scared of it.
It will not happen so my feeling are neutral..
It is not something I concern myself with.
Then human existence is no longer valid. That's quite depressing if AI replace humans completely.
It never will because of the ability to evolve by the human brain
Kind of scary
Not sure.
Not sure.
promises
I don't think that we can evolve positively as a society if we replace humans with artificial intelligence. Civilization as we know it will crumble, and all structures and institutions, whether political, economic, social, or cultural, will crumble. We are humans. Let us remember that simply because we can do something is no reason to it. Let us remember that humans have capabilities that no robots yet have. Let us stay human and not destroy everything we know with artificial intelligence.
It won't. Humans are creative. And sometimes very, very stupid. You can't program that.
.
I find this concept to be laughable.
I am unconcerned.
Already have to some degree with welding robots in automotive assembly plants. If they can perform a better job then great, they same money and time. They can't replace humans for everything though.
I am scared. F*** that.
See Player Piano by Kurt Vonnegut
depends on its application. if they start taking human jobs, it would be very bad.
It's been alright so far.
I am fine with AI replacing humans.
If it is to benefit and provide assistance to humans then not too badly.

Depends on the application.
I think it could put a lot of people out of jobs and change a lot of the priorities people have in their life. We might become a society based on expediating all processes instead of enjoying them for what they are. Humans are so complex and there are lots of factors that influence decisions. We don't even know everything about how we work. So then how can we design something to replace us?
It would be both satisfying and disheartening to create something that can surpass you. In the same way a parent can be proud of their aspiring child, humans can be proud of AI. If that child (AI) starts acting against commonly held human morals, then the parents (humans) would be angry, disheartened, and regretful.
Content. Many jobs have already been replaced by machine-labor. Eliminating telephone operators raised a stink at the time, but in retrospect we see that it was a good thing. I welcome tasking machines with menial labor so that we can take on more meaningful activities. We approach the dis-necessity of labor.
Like we wouldn't let it happen
Interested
Something's just not quite right about it, but there are many more pros than cons.
I don't think it will ever replace humans, because AI has no emotions, has no feelings, and those emotions and feelings are something that sets us apart from machines. I feel that they will become important to our lives, but I do not feel that it will ever be able to replace the human mind. If it ever does replace humans in settings such as war, or in surgical procedures where emotion and constant observation of what is really going on matter, if we send a machine in to destroy a sleeper cell, and in reality it is just a small farm, the AI wont think twice about firing on the location whereas a person might question it.
I don't feel that it is a good idea.
NO
hate it
Fine
I don't care about this subject. There is no real chance of Artificial Intelligence replacing humans, because replicating the non-reasoning parts of humanity seems unlikely and an inane task for scientists.
scared and curious
n/a
They dont have emotions
Insufficient coffee at this time.
not sure, mixed feelings.
worried
Terrible
Its a little perturbing, as many lower level jobs could be replaced by ai systems designed to make others lives easier. Seems like a step in the right direction technologically but i imagine it will cause more human suffering than help in the long run as we sacrifice jobs for convenience.
Is it possible for human thinking to be replicated in machines? I answered no because by definition, a computer could never think like person because a robot is not a person. Some aspects of human thinking may be replicated, but human thinking comes from a mixture of interactions with the environment and the self. Will we force robots to be raised in a robot family where we expect robots to raise other robots like humans instead of the robots they are (and will a self aware robot accept this lack of freedom because we are trying to mold them into something they are not)? Prob not. Will a robot appreciate existence? Do you appreciate existence?
unsettling?
I am indifferent. It would not upset me if it happened, yet I would not be excited either.
If it's more efficient, why not? What we should care about is getting a job done, not how it's done.
i don't mind it, but there are things you can't replicate like emotion
It will probably happen after my time so I'm not too worried.
good - already answered this on a similar survey

don't care, it's progress
useless
Neutral.
I don't think it will happen because you can't put feelings in robots.
If it completely replaces humans, that is bad, but if it reduces workload that is good.
Well. It sucks.
It's really something I view as so impossible at this stage (and so off my radar) that I really can't say I feel any emotion about it. If we were anywhere close to completely replicating human brains, I guess I would feel some apprehension, but that totally depends on where the technology was at that point and what exactly it meant to "replace" a human.
In some contexts, it makes sense, but in others, it takes the humanity out of experiences. If a taxi cab drives itself, there's no chance for conversation with the driver. For some people, that's a good thing; for others, it's not good.
I don't know what's Artificial Intelligence
It's baller, I wish it would happen in my lifetime, although I'm doubtful.
I do not like the ideas of computers being smarter than humans.
Indifferent
Personally, I don't believe it's an issue. Yes, there will be some jobs at which an Artificial Intelligence will be better than a human, but I don't believe that any AI could ever gain the "intuition" of a human.
Good I think that some jobs will be performed better by AI
I am not programmed to have emotions.
Not possible. They are made by humans at the first place.
.mhn
I'm not worried about it, because we create artificial intelligence, and if we didn't, it wouldn't be artificial. We can control the extend at which this can progress.
scared
should not replace humans
Negatively
I feel that artificial intelligence is potentially an extremely powerful technology that will need to be handled very carefully just like any other powerful technology, such as nuclear power. Just like anything else it has the power to save lives and to destroy them, so scientists and engineers experimenting with AI will need to be conscious of this when they begin to approach true artificial independent thinking in the future.
Religiously I personally dont care but it is going to mess up half our society when it arrives were it to occur any time soon.
As long as humans are in control of the processes A.I. work upon, I do not have an issue.
I don't like this idea. AI are just machines after all. They should be more like a tool instead of being considered as replacements of humans.
It won't happen, and it would be very disturbing if it could.
Unfortunately, that's exactly what humans are trying to do right now, especially with big corporations who are trying to cut their costs by replacing humans with machines that could do their work with an even better quality. Personally, I think it's a bad idea because no matter how advanced machines become, they still don't have the perfect human touch.
Sounds hot frankly
I'm perfectly fine with it, and welcome the chance to be made obsolete.
So long as robots do not handle weapons, I am glad
No algorithm can behave and reason like a human mind. A robot may replace a human being for a lots of tasks but it wont replace "being human".
Why would AI replace a human?
A computer will never be able to replace human stupidity (a major part of creativity).

Because we control AI and create it, it will not replace us.
Low degree or level of AI is ok. There is no harm out of a system recording and "learning" to improve efficiency. They are still bound to strict programing. The problem arises when AI reaches to the point of human thought and critical thinking, and have considerable power to affect humans, either positively or negatively. What if the high level AI gets angry at someone? Could the AI have impulses like humans and how will that affect us? Us as humans live for many years and learn as we go before we are given responsibility and independence. How juvenile will the high level AI will be? I imagine that humanoid robots would be possible at the time of human level AI. These robots will probably be smarter than us, stronger, and last longer than humans. How would we interact with them? Will they be slaves to us? Would humans be racist to them? It's as if these robots are a new animal species. I guess the slower the development and exposure of the technology to society, the less of an noticeable impact will be. And many of the issues could be addressed and solved before any serious problems arise.
I think the term "replacing" is improper. I think that in certain scenarios artificial intelligence will be very helpful in manufacturing, and in helping people live their daily lives. However, I think having emotions and being able to perceive certain situations is something very necessary, which artificial intelligence may not be able to do as well as a human.
I don't. I feel if that would happen it would only represent a natural order.
acceptable.
Good in some circumstances
Good idea, humans suck
I feel neutral
Not good
I do not think that AI can replace humans because something artificial does not have a soul.
Irony
Neutral
As long as we find a way to avoid our creations exterminating us, and keep them in check and making the world a better place, I am fine with it.
I think the choice of 'replace' is a term that encourages negative emotions. I think that the question is too vague to really respond to. In many ways machines have already replaced humans. If by replace you mean "Wipe us all out and take over" then of course I think that is bad. But if you mean "Handle more and more of the work that we ourselves do?" Then that sounds great. We can spend more time doing what we want to do rather than what we have to do.
Not sure.
I dont like the idea but there is no stopping the inevitable. Might as well embrass it and enjoy the luxuries it brings about.
I wouldn't mind Artificial Intelligence replacing humans in their jobs.
First you'll need to define what a "human" is, since that is a more important question. What happens when one's consciousness can be uploaded into a completely artificial body? Are they still human? Are true AI's alive or dead? Are they "human"? There are a lot of questions here. Personally, I'm excited to find out the answers.
.
I don't really have an opinion.
A good thing as long as it is provided for a greater good.
Neutral, if we create it, it is a reflection of us.
we won't be robots!
Just fine, we probably deserve it.
*Resignation
An incredulous idea.
don't like that

Comfortable with robots replacing humans because I believe they will lack the creativity to design circuitry and write code to sustain itself. How would something without the comprehension to perceive reality understand how to do something without modeling or copying some other behavior. Copying another animate object is the extent of the state of the art robots.
not good
I am not sure that I'm entirely able to separate an emotional response from a logical one. I don't know the answer to this, but it seems that a system programmed by a human with a code written by a human to replicate human behavior can't logically surpass the human "ability" (whatever that means). At any rate, I can think of many people whose replacement by an AI system would leave the world a better place. I suppose the worst-case sci-fi scenario does instill some sense of fear/worry, but on the whole I believe there are enough real threats to the planet that we shouldn't concern ourselves with that eventuality.
Maybe Artificial Intelligence will do a better job than we did.
I feel indifferent as of now but it depends on how they will replace humans. If it will be disastrous replacement it will be painful but if it will be in a friendly way and bring good I would be happy. It also depends if Human beings will be able to provide AI with feelings or not which I think is highly impossible.
If replacing a human with a robot in a certain capacity is a net benefit to humans, then there should be no hard feelings.
I think it's a good thing, as long as you're talking about replacing humans in things like hard labor and stuff like that.
I feel a little scared. My perception of real artificial intelligence is a system whose actions we have no control over. Even more so, we are unable to predict them. I think that is too threatening to be considered socially viable. I mean, it is ok to have humans doing weird things around the world, but having robots do the same?
Not a good idea. How bad would it be to have a group of religiously fanatic military robots?
No problems.
Fine, because it won't happen.
sad
Not possible. Humanity transcends the logical ability to perform tasks
Sooner = better, I plan to work less, cuz that's the computers job!
Neutral
emotionally, I do not believe AI will ever be capable of LOVE like humans are.
They won't.
Will never happen, AI doesn't know what love and passion are
I want an emotional conection. I don't think I could have a relationship with a robot.
Scary and probably unethical. I would suggest that AI should have as primary aim to build machines that help humans with their thinking in order to resolve unanswered questions, prove unproven theorems. ...but not to replace humans because such necessity doesn't even make sense.
hopeful because I don't think AI will takeover humans in my liftime
I feel confident.
Very seriously. I dont think a computer can ever offer the compassion that a human can offer. A hug from a computer will never be the same as a human.
As long as I can link up before I go I'm ok with it :-) It doesn't bother me, assuming it's a peaceful process.
Neutral
Again, the point is not that AI will replace humans, so I can't answer the question as posed.
bad
Although anything is possible I would be doubtful if this type of interaction were to occur, at least any time in the near future. As far as replacing humans there may be a mesh of interaction but for a full organic and chip based interaction seems unlikely.
It seems inevitable.
Extemely cautious and suspicious.

Scared, aprehensive, excited but nervous leading to some antisocial behavior
I do not really have a positive or negative "feeling" about AI, because, as stated above, I do not think it is possible to contain the "creative" portion as described.
not even sure that's desirable
Again, if you ask someone, "do you want to be "replaced", I think most people would say NO, BUT if you ask someone, "Do you want your car to drive itself?", most people would probably say, "Sure, that would be cool!"
On a limited basis, I am OK with the idea, but I think a uman will always be necessary as the support (programmer?) of whatever artificial systems may come into being.
Won't happen. Would not want it to happen. In the
kind of sad and scared
Lets go!
I have no issues with it morally or emotionally. I am an engineer and appreciate science and teh possibilities
While artificial intelligence can certainly surpass human ability in logic and mathematics, the non-quantitative and quirky aspects of humanity are unlikely to be replicated.
I don't have a problem with it emotionally. The challenge is engaging the displaced humans in other roles beyond restaurants and baggage checkers.
sad, scared, but curious
fine for the most part
Scared.
Don't believe it will happen cause humans are feeling and don't believe feeling can be replicated
Again,if some maniac doesn't conjure up a destructive force-I feel AI cannot totally replace humans,but I worry about who the technology will be sold to.AI would be great to do jobs that are hazardous to human health,etc
uncomfortable
do not like idea
I don't think it fully can, particularly the emotional aspects of human life.
not certain
not worried
Fine, so long as the AI system reduces human errors, or reduces human accidents, etc.
At mundane tasks, no problem. I don't think that AI-based systems will replace humans at higher-level tasks anytime soon.
unrealistic
it's a little disturbing if it means putting people out of work and if I think about the possibilities of things that could go wrong, like losing control of technology
neutral
OK
Positive where it's a good application; not positive where it may diminish human existence.
Has potential challenges for people politically.
I can't accept the concept of "replacing" humans.
I don't know enough to know how I feel.
It happens in certain actiivities already
This is an unanswerable question. Replacing humans at doing what????
It feels to sci-fi to me. It is precisely emotionality that computers will not be able to have. This is part of the functioning of the brain .
Not worried about certain kinds of tasks requiring efficiency, but concerned that human (and animal) instincts will be devalued.
Not good.
I think it would be a good thing.

Pretty bad but since I don't think it will ever totally occur, I don't feel bad about AI

Field summary for body01-03

Name an example of Artificial Intelligence.

Answer	Count	Percentage
Answer	415	99.05%
No answer	4	0.95%

A robot being able to survey the area ahead of them and drive based on the picture it got.
chat bots, like the one I'm creating for my science fair project
Your face
Well programmed Scrabble opponent that does not just spit out the best word, but accounts for what tiles the human player might have, thus, it has strong defensive play.
Cell Phone App (Android)
Computer applications
Madden Artificial Intelligence
MIT Robots
Real time Strategy game opponents
Robots that talk back to you on aim, etc
Computer controlled players (bots) in video games are often called the AIs due to the fact they use Artificial intelligence.
Mercedes cars driving themselves
Google's new Prius that recently drove itself in California both on a highway and in traffic.
The Governator!
computer games use AI to simulate the actions of characters, such as realistic enemies that act like the being they portray
Hal 9000
Google's suggestions based on past websites visited.
Computer vision
One of those little vacuum robots which scoots across floors and navigates by itself, cleaning more than most people would.
My computer deciding to restart because of some random windows security update with all my programs open.
Speech recognition software which learns the user's voice for more accurate recognition
C3P0
some iPhone apps
Google's new Live Search
Computers.
the videogame characters
smart phone
Computer Calculator Army robot
amazon recommendatios for you section. **This was a difficult survey to complete. Some questions were confusingly worded and your definition of artificial intelligence was never defined. I have no idea if i appropriately answered these questions.
Robots.
The artificial intelligence thing at the Boston Science Museum
robotic service
Robots for the paraplegics in assisting them in daily life.
Call of Duty Zombies
"Please say a command.." prompt on cellphone, or voice dial options. (Sorry if this isn't what you are referring to.. the computer-checkers example apologizes as well)
The robot R2 that is being prepped for space missions.
A computer interacting with the person, such as a voice recognition system
That honda robot.
robots
System Gaming, characters that you interact with in a game
Google's Priority Inbox

Video game enemies.
Robo-surgeons in advance hospitals
A self taught "lifeless" organism.
Enemies in the majority of modern video games.
Certain Robots
20 questions website
...
chobits
Learning programs, like dragon Speak and gmail.
smart phones
The new computer system allegedly capable of "learning".
machines that assemble cars
a robot at war
Deep blue; Magi.
robots
robot that can respond accordingly when an emergency call is recieved
gps application on a cell phone.
Robots that can be remote controlled and perform accurate surgery
BORG
wow characters
Bots used in Video Games
Cleverbot
pc game
World of Warcraft (so I've been told)
internet
the matrix
Robots
a computer
Computer applications
Robots
Computer
Recent work on robots on campus.
Itunes Genius
Conversation programs that allow one to hold a "conversation" with a computer as it responds logicaly to statements.
Roomba, Digital Rice Cooker
A mechanical face capable of reading and responding to emotions.
A videogame being programmed to track what strategies players use throughout a game, and then developing it's own strategies, through trial and error, to counter them.
Cleverbot
Flying planes in the USAF without a pilot.
Hal-9000
Robot/driods.
robots
Cell Phone
WolframAlpha
The Droid
washing machines that text you when your laundry is done= not necessary
A very simple example would be a thermostat.

Smart Grid systems.
automated phone operators
video games
The simple AI that responds to attacks used in most RPG's.
robots
Computer chess.
The Rooba, which vacuums floors on its own.
Not sure
the computer you play checkers with online
Deep Blue
terminator
Solving problems, thinking for itself.
Nao (Aldebaran Robotics)
Robot Simultaneous Localization and Mapping
Honda's robot
self check-outs
Stanley, the Stanford University car that drove in the DARPA challenge used machine learning, which I believe is a form of AI, to learn how to stay on the road across the desert.
Google.
robots
Unmanned Aerial Vehicles
Terminator
My cell phone when it reads my voice and gives me directions somewhere or calls the person I said.
have none.

car that parks itself

I have a feeling Pandora uses some intelligent programming.
Sunny from Irobot
robots
robots
smart phones
A "smart house".
that little robot that sweeps the floor by iRobot
a robot trying to find a path through a maze
none currently exist
A robot
iPod application
Google.
computers that memorize your preferences.
Robotic car manufacturing, telephone call support systems, GPS systems, Voice recognition programs.
?
Google Translate
Google
skynet
A game of tic tac toe against a computer.
Genius toolbar in iTunes

robot, pretty much anything that can interact with a human that is a not alive
Robots!!!
online website recomendations
Sheldon from big bang theory. What a whiz kid!! studly.
cellular device?
Google voice transcribing voicemails to text, Google's search engine trying to find the sites you want, Zeno the robot.
Bots in wow
Computer opponents in video games.
Cleverbot.
A learning program that reacts to human input and revises its reactions over time.
A device or program that can reason and think on its own.
iPhone?
the self-instructing iRobot vacuum.
Deep Blue
GENIUS!
The terminator
The AI that is the villain of Eagle Eye.
There is very little that I consider to be anywhere near actual AI, since I know how to write most of it. Unfortunately, many "AI"s are really little more than a series of if statements. That said, the computer opponents in Starcraft 2 have enough complication that it's hard to keep track of all the calculations they'd be doing, so they are an example of AI as we have it now.
A robot.
Deep Blue
Netflix.
Cortona from HALO
a
Playing against the computer in a "multi player" game...such as League of Legends. (Simple example but oh well)
Databases that learn what I like as I search through them, like amazon, who recommends books to me based on other books I have looked at or bought.
Self-checkout machines
/
?
Autonomous direction of a robot working off it's surroundings - DARPA Grand/Urban challenge.
A robot that can perform specific tasks much like a human would do .
smart phone, chatbots
iPhone
video games NCPs
robot
the Mars Rover... I'm not entirely sure.
smarterchild the aimbot
Robots in iRobot
Video Game NPCs
Google's auto complete feature when you're searching.
dont know
A program able to predict future events based on past events.
Almost any automated machine which has a reaction to any sensor it is connected to. GM was or is working on cars that do not need a driver.

Cleverbot
N/A
A self-checkout at a grocery store
prosthetic
Self driving car.
Cleverbot. Gmail priority inbox.
Optical Character Recognition of images.
Eurisko, Deep Blue, Video Game Bots, etc.
Computer players in games.
ASIMO!
compruuters
Computer program that writes music.
Cleverbot
google anticipating searches based on history
Automated customer support management systems, automated assembly lines, adaptive or predictive software
EVERYTHING
robots
cell phone?
iphone app
trying to create robots that can think so that humans don't have to.
.....haley joel osment
Agents in the matrix
robots that pilot themselves in space
rhoomba
Expert Systems at hospitals
Automatic breaking systems in the volvos?
a car that can parallel park by its self
Computers.
self checkout
The speech recognition on Windows 7
Pandora radio knows what music you like.
Those little games I play online pretty much every day- the computer player has AI.
robin williams in that movie
Deep Blue CALO SHIAI ....Skynet
autonomous vehicles
Computer
dish washers
Google's new self-driving cars
Code compilers.
gmail's priority inbox
ASIMO
car that parks itself
computers that can solve problems

cars that drive themselves
An artificially intelligence device could be a robot that automatically vacuums a carpeted surface every week.
g

robots
IBM's Watson supercomputer.
Asimo
Computer
""A group of computer engineers is convinced that the basic technology is now available to create robot assistants that can perform effectively in the often-chaotic environment of the emergency room"" http://www.sciencedaily.com/news/computers_math/artificial_intelligence/ thats really not ok.
AI that plays chess
"The Source" from The Matrix
Military reconnaissance planes.
not sure
Search engines. Not only do they replicate a human's ability to relate topics, many times it seems the intelligence behind the recommendations are strictly artificial.
machine learning, neural networks

Computers, robots, smart phones, cars that drive themselves
Johny-5
Pleo
robots that can be programmed to perform certain surgeries autonomously
Computer players in video games.
Towel folding robot
Computer simulation of an aircraft pilot
robot waiters?
The Japanese robots being used to replicate human emotions. Not sure if Asimo counts.
micromouse robot
AI in games to control enemy characters.
voice recognition, robots,
Any Computer
automated manufacturing machines
A robot that is able empathize with a human and express emotion
Robots in a production line.
promises
Robots
The roomba.
.
NCPs
Pandora Internet Radio.
Automotive welding robots on an assembly line.
Google, cookies, other computer run programs.
See Player Piano by Kurt Vonnegut
cant think of any now.
The Restaurant Game Project
HAL
Self-learning applications.
Soliders and assisted living.
Pro-E assumes the constraints on my parts
Big Dog

An intelligent email filter, a bot that can somewhat carry on a conversation, a car that can drive itself, a game that can estimate interest and emotion
Automatic language translation
A system that looks at a problem and determines a way to solve it
NELL
Cleverbot.
Robots Auto Pilots Cell Phones to some extent Software applications
Any type of robot.
NO
cell phone aps
Google
You probably need to give a full definition of this before you ask this type of question. The phrasing of all your questions assume too much, and limit the answers we can give to a very limited amount. I didn't see a comments section, so I wrote it in here instead.
terminator
n/a
no idea
Computer game Bots.
baby robot somwhere in asia, that is meant to train fortcoming parents or even to serve the full need of a baby.
unknown
Asimo
Robots or programs that can perform a task or various tasks without human input. Ex, Rhumba Vacuum
robots that learn
?
speech recognition software
Game enemy AI
the robots from irobot
You did before - smart phone applications, etc.
email filter, car manufacturer, gaming programs
a video game playing AI that can interpret input received from the game in a way that a human would receive the input
v.i.k.i, (iRobot)
Datamining programs.
Smart phone applications where you can download your genetic code.
Playing against the "computer" in a video game.
A sex machine that automatically slows down as you cum, so it doesn't hurt, or a woman.
Natural language text summarization.
Netflix recommendation system.
:(
CleverBot, the online chatting AI.
Robots
The Terminator The machines in The Matrix Coding in videogames
The speech-recognition system built into the WPI phone system. P.S. You may have received a lot of emails/whatever about this already, but it's "millenia", not "milleniums"
Algorithmic friend selection, targeted advertisement
me
Electronic guide.

,k
macros that can analyze data in ways that you could not see or put together yourself.
r2-d2
robots
Matrix
Skynet
Radio controlled robotic "bugs" that can navigate and memorize environments via I.R. and "touch".
robot
?
Cars who parallel park themselves and those who could do things that humans sometimes are unaware of like realizing the distance between one car and the other car in front of it.
Control surface movement on nontrivial airframes.
Melvin. WPI's humanoid robot.
Melvin at WPI (http://www.wpi.edu/research/magazine/2008/tools.html)
Google what else! ASIMO is a good one!
Computerized game adversary.
Firefox address bar
auto correcting texts (words you have used before).
Thermostat regulator - records heating and cooling cycles and use the data to stop over shooting target temperature.
Robots
Restricted Boltzmann Machines, Recurrent Neural nets
robot
Cars in DARPA challenges
Hidden Markov Models
Not sure what you define artificial intelligence to be
Honda robert
I use a primitive form every day to heat my house. My thermostat measures the temperature of my house and compares it against the set point. If the house temperature is below the set point, the thermostat turns the heat on. If the temperature rises above the set point, the thermostat turns the heat off.
Robots
Any system that can think on its own without the direct interaction of a human
blonde girls who dye their hair other colors
When I type in a query into google it tries to complete what I say and often will correct my spelling.
A computer that can play chess against an opponent.
Simple examples: ABS brakes, sensor cook microwaves, Roombas.
?
Behavioral programming.
.
The backgammon CPU player on my cell phone
Cleaning robot, which is able to detect dirt on the floor and clean it without human orders. Work also for swimming pool.
The ability of an algorithm to learn and evolve from exposure to data sets which increment its experience and provide it a referential history.
computer
Video game AI

*A Data Mining agent that can look at mass quantities of data and find a pattern in the data.
I'm not aware of anything that has been created by humans but still is self-aware, and has the ability to exercise full free will. i.e. nothing that is truly intelligent, but yet artificial (not created by nature).
computer game
There is no such self aware machine yet. The field of Artificial Intelligence exists but I don't think there is such an example.
Solder Robot
Smart web browsers? As in, I surf to a few shopping sites and buy one or two products and then the day after, web ads are showing up in sidebars and selling similar products to what I just bought.
ELIZA.
Not sure... google may be
Spam filters.
The Mars rovers.
My e-mail spam filter.
Pandora Internet Radio
The Gizmo-like critter from the MIT Media Labs.
video games
RPI's CLARION model
Computer vision; blob detection, edge detection, and related transforms. Local minimum/maximum, hill-climbing with adaptive heuristic weighting, etc.
pandora.com
my Mac computer.
WolgramAlpha
n
My android phone making my life easier knowing things I like without telling it.
A program that "watches" the web sites that you like, and "suggests" other web sites that you may like.
almost anything that requires computing power ... internet search
a GPS system contantly trying or deciding how to guide you to your destination.
Robot
adaptive cruise control
Roomba
IBM Deep Blue (Chess)
computer systems that learn from previous computations
Robotics and machinery
Robotic surgery
Some iPhone apps.
robotics in the medical field, performing procedures/operations
I am thinking more about intelligent systems, such as differential diagnoses decision tools, when I think of AI and am not sure if you are thinking of something else.
aren't my car's ABS brakes an example of AI?
Well, now that you gave me one example with taxis driving themselves, I can think of dozens of examples like that. Before providing this example, my idea about AI would be like what was depicted in the movie, The MATRIX, or in old sci-fi movies like Star Trek (the Borg), where machines make slaves out of humans.
Airplanes that land themselves (autopilot taken to the next level)
US Federal Government

When websites say "if you like this product, you may also like this product"
From WSJ ARTIFICIAL INTELLIGENCE Mr. Son said a machine will be able to learn on its own, feel emotion and function much like a human brain in the near future. He said the human brain has 30 billion neurons working on a binary system of “on” or “off.” Similarly, transistors on a computer chip also function in binary way. Based on his calculations, a chip will reach the 30 billion transistor threshold in 2018 – putting the computer chip’s raw horsepower at the same level as the human brain.
The avatar project I'm working on will learn from the crews it flies with.
interactive games
roomba vacuum cleaner
robots- cloning?
expert systems
no idea.
Not sure
cell apps,web apps, robot vacuums,assembly line robotics,Smartphone&the like.
not sure
cylones
research systems
google applications
smart car
Smart traffic lights that sense traffic jams and adjust accordingly.
Data gathering by underwater autonomous robots
XCON - developed by Digital Equipment Corp in 70s-80s for configuring VAX computer systems for customers.
google, I think, which anticipates what I'm searching for.
no
Chess games between humans and a computer
Amazon recommending alternative books based on what the viewer is exploring or buying.
Rumba
Google search anticipating what I'm searching for before I finish typing.
e-harmony?
Knowledge Based expert Systems
voice recognition (when it works), autonomous vehicles, language translation (if it works)
don.t have one.
Phone apps.
Dunno -- a voice having a conversation with me about a perscription I'm ordering by phone?
robotic surgery
The texting feature on my iPhone that guesses or corrects my spelling of a word; the Google feature that offers options as to a subject as soon as I start typing

Appendix II – Survey

Artificial Intelligence: Through the Eyes of the Public

This survey intends to explore the impact of Artificial Intelligence on the general public and gather data to help assess the state of Artificial Intelligence in our culture.

0% 100%

Background

A generally accepted definition of Artificial Intelligence is: The study and design of intelligent agents, where an intelligent agent is a system that perceives its environment and takes actions that maximize its chance of success.

* **What is your age?**

Only numbers may be entered in this field

***What is your occupation?**
Choose one of the following answers

- K-12 Student
- Higher Education Student
- Employed
- Unemployed

***What is your gender?**
Choose one of the following answers

- Male
- Female

***If applicable, what is your technical background with computers?**

Rate your answer on a scale from 1-5, with 1 being no technical background and 5 being a strong technical background.

1 2 3 4 5

***Do you consider yourself good with computers?**

Rate yourself on a scale from 1 to 5, with 1 strongly disagree and 5 being strongly agree.

1 2 3 4 5

*Have you ever taken a class in Artificial Intelligence?

Yes No

*Where do you get your news from?
Check any that apply

Newspaper
TV
Radio
Internet
Magazines
Other:

*Name a recent event about Artificial Intelligence that had the most impact on you.

This might be a story you heard through the media or via a friend.

*How do you think this event was portrayed?
Choose one of the following answers

Positively
Negatively
Neutral

Resume later << Previous Next >> Exit and clear survey

Artificial Intelligence: Through the Eyes of the Public

This survey intends to explore the impact of Artificial Intelligence on the general public and gather data to help assess the state of Artificial Intelligence in our culture.

0% 100%

Body

Below are our main survey questions. Again, your cooperation is greatly appreciated.

A generally accepted definition of Artificial Intelligence is: The study and design of intelligent agents, where an intelligent agent is a system that perceives its environment and takes actions that maximize its chance of success.

***When was the last time you heard about Artificial Intelligence in the media (TV, newspaper, radio, internet, magazine)?**
Choose one of the following answers

- Today
- This week
- This month
- This year
- More than one year
- Never

***If applicable, how do you think Artificial Intelligence was portrayed in the story?**

Rate how you think it was portrayed on a scale from 1 to 5, with 1 very negatively and 5 being very positively.

1 2 3 4 5

***Do you interact with any artificially intelligent systems regularly?**

For example: intelligent web applications, cell phone applications, computer software, consumer robotic products, smart appliances.

Choose one of the following answers

- Yes
- No
- Not Sure

*How many artificially intelligent systems do you interact with on a daily basis?

This number is probably greater than one.
Choose one of the following answers

- Less than 5
- Less than 10
- Less than 20
- Less than 50
- More than 50

*Is it possible for human thinking to be replicated in machines?

For example, a computer that could problem solve like a human.

Choose one of the following answers

- Yes
- Possibly
- Don't Know
- No

*Do you believe Artificial Intelligence will replace humans in the future?

An example of this could be taxi cabs which drive themselves.

Choose one of the following answers

- Yes
- Possibly
- Not Sure
- No

*Do the promises of Artificial Intelligence scare you?

- Yes
- No

*How far are computer scientists from creating intelligent machines capable of replacing a human?

A few months	A few years	A few decades	A few centuries	A few millenniums

This might happen in:

*What do you think Artificial Intelligence will bring in the future?

*Will artificially intelligent systems exceed all reasoning abilities of the human brain at some point?

This means computer systems which are more capable than humans at any given task.

Yes No

*How do you feel, emotionally speaking, about Artificial Intelligence replacing humans?

*Name an example of Artificial Intelligence.

Resume later << Previous Submit Exit and clear survey